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COMPUTERWORLD

Bull cuts gore U.S. group

'Transformation' will trim 5,000 worldwide

BY SALLY CUSACK
CW STAFF

PARIS — The computer industry's economic slump was defined as a "worldwide crisis facing the computer industry" by Groupe Bull last week as it announced that it will reduce its worldwide work force by 5,000 people and restructure internal operations immediately.

"The industry is reacting like lemmings to the sea," said Robert Kidd, an analyst at Dataquest, Inc., a San Jose, Calif.-based market research firm. "The question is, who will safely reach the other shore? Groupe Bull has taken appropriate actions to restructure the organization appropriately, given the economic times."

With about half of the job cuts targeted for North America, analysts speculated that the firm is taking advantage of the tough economy to eliminate lingering overhead from old Honeywell operations centers in the U.S.

"Their profit crunch and the soft computer industry are very real," said George E. Lindamood, a senior analyst at Gartner Group, Inc. in Stamford, Conn. "They haven't hacked away at the deadwood before this, but I think the bean-counters are having their way at this point."

In the U.S., Bull HN Information Systems, Inc. said it anticipates reductions of up to 1,000 employees in Massachusetts, 250 in Arizona, and as many as 350 people will be cut at Bull's field locations throughout the U.S. The firm plans to implement an early retirement plan.

Employee reductions will start immediately and continue through December 1991. These will be in addition to the 2,500-person work force reduction that

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SPA set to raid business site

BY MICHAEL FITZGERALD
CW STAFF

WASHINGTON, D.C. — The Software Publishers Association will turn up the heat this week in its antipiracy campaign with a new advertising campaign and a planned raid on a major corporation suspected of illegal software duplication.

SPA litigation manager Peter J. Beruk told *Computerworld* last week that a corporation with several hundred personal computers will be raided by federal marshals with a search-and-seizure notice that will allow SPA officials to confiscate all pirated software on the hard drives of their machines. A second company with a similar number of PCs will be raided as soon as possible and likely before the end of November, he said.

The SPA hopes to keep most corporations on the straight and narrow with its new ad campaign, to be unveiled at Comdex/Fall '90 in Las Vegas today, featuring the slogan "Don't Copy That Floppy."

However, the SPA will take stronger action against those it considers to be flagrant violators.

"These companies pretty much have the belief of buying one copy [of a program] and spreading it around on their machines," Beruk said.

In most cases, the SPA sends a letter to the president of a company detailing what software the company is suspected of pirating

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Comdex pointers

- 386SX-based laptops flood Vegas, but PC managers want more — guaranteed national support.

- Multimedia products will be a hot topic at the show; later this month, Microsoft and allies will capitalize with hardware and software platforms.

Comdex stories, pages 142-145.

Manny Hanny downsizes

BY ELISABETH HORWITT
CW STAFF

NEW YORK — Today is D-day at Manufacturers Hanover Trust Co. as the scheduled switch-over of one of eight data centers to a new facility in Wilmington, Del., kicks off a major downsizing project.

The project, approved by top management last February, calls for the financial company's eight New York data centers to be folded into two: the Wilmington facility and a renovated existing site here, which are expected to be linked and running full work loads by early 1992.

The Wilmington operation will be an almost "lights-out" facility that will back up the New York site. Most IS staffers, such as systems developers, will continue to work in New York.

Personnel reductions will be a significant element of its strategy to save $20 million to $30 million annually in data center operations. Yet so far, Manufacturers Hanover says it has managed to avoid the serious morale problems and mass exoduses that have accompanied belt-tightening measures at some other service firms. IS turnover has been "minimal and controlled," said Executive Vice President H. Edward Nyce.

Bank VP Nyce *oversees changes*

The bank has "made no attempt to shield people" from knowledge of downsizing measures to come, Nyce said.

Last June, Manufacturers Hanover announced that it would be decreasing

To page 14

DEC spins DBMS net

BY MARYFRAN JOHNSON
CW STAFF

BOSTON — Bulking up to get a grip on the corporate database of the future, Digital Equipment Corp. pumped out new object-oriented products, relational database access tools and a long-range strategy for its multivendor distributed database last week.

As its long-range goal, DEC sketched out the "Information Network," a software framework that parallels IBM's Systemview strategy for managing corporatewide information systems. The DEC spin, however, emphasizes multivendor integration through a suite of at least two dozen data management products.

"We want the premier place in integrating everything," said David Stone, vice president of software products at DEC. "The Information Network vision is you can take the data manager to any platform the customer chooses."

During the next six months, DEC will flesh out this distributed software architecture with descriptions of specific products and delivery time lines, in much the same way IBM gradually rolled out pieces of its Systems Application Architecture. But it will be 1993-94 at the

Continued on page 6

Users bemoan upgrade-itis

BY PATRICIA KEEFE
CW STAFF

Inundated with endless software upgrades and fixes, personal computer managers are struggling to come to grips with the increasing burden of hidden costs, support and administrative demands.

To ease the aches and pains of the so-called "upgrade decade," some users at influential corporate sites are beginning to insist that suppliers take a page from mainframe and midrange software developers and provide maintenance contracts. These arrangements typically call for the vendor to automatically upgrade the user with all patches and minor and major upgrades in exchange for a flat, up-front fee.

"We are trying to move toward having a maintenance agreement with all our vendors; we don't want to get nickeled and dimed to death on upgrades," said Price Waterhouse Technology Director Sheldon Laube.

However, it is not yet a common practice. "I have not met one supplier willing to do that or even broach the subject," said

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Product Spotlight: Choose the PC or workstation that fits your needs and your wallet. Page 97.

Report puts NCR, AT&T in negotiations to merge computer businesses. Page 4.

Unisys scoops Ford outsourcing deal, while Unruh warns users of tough choices to be made in R&D. Page 6.

In Depth: For many in IS, life in the '90s is exciting but stressful. Page 113.

COMPUTERWORLD BUYERS' SCORECARD

Value for the dollar

PC users rate HP's Vectra as the best value. Ratings based on Buyers' Scorecard, page 104

Product	Score
Hewlett-Packard Vectra 80386 series	61
Apple Macintosh II series	59
Compaq Deskpro 80386 series	57
AT&T 6386 series	57
IBM PS/2 (80386 models)	56

(Maximum score: 83)
Response base: 50 per product

CW Chart: Paul Mock

NEWSPAPER

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> *"If they can keep it working in Ulysses, [Kan.,] then they can make it work anywhere, and if they can't, then we have problems."*
>
> RICHARD NELSON
> NEW YORK LIFE
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> *On the importance of national support for laptop computers. See story page 144.*

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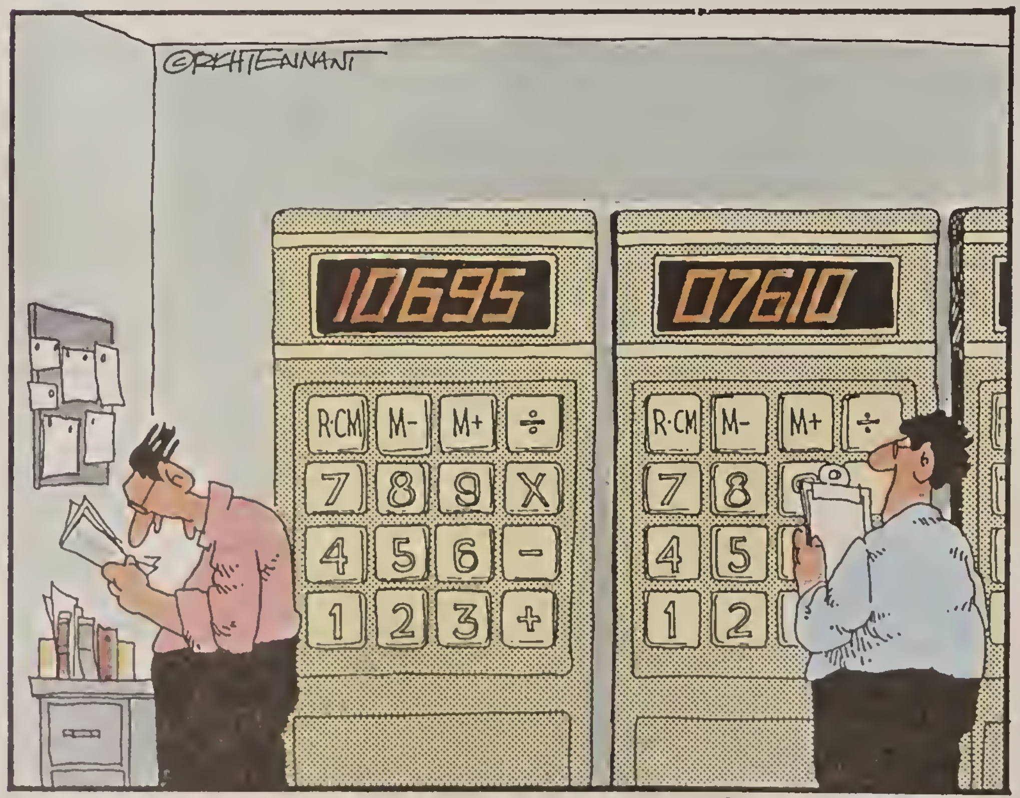

"IT SAYS HERE IF I SUBSCRIBE TO THIS MAGAZINE, THEY'LL SEND ME A FREE DESKTOP CALCULATOR. DESKTOP CALCULATOR?!! WHOOAA – WHERE HAVE I BEEN?!!

EXECUTIVE BRIEFING

■ **Raid!** The Software Publishers Association said it will bang on the door of a major corporation this week with a search-and-seizure order to confiscate illegally copied personal computer software. The SPA, putting its antipiracy program into high gear, will also unveil a new "Don't copy that floppy" ad campaign at this week's Comdex/Fall '90 in Las Vegas. **Page 1.**

■ **Ford took the outsourcing plunge,** contracting IS in some of its divisions to a new player in the commercial outsourcing market — Unisys. Unisys will consolidate Ford data centers into a new Unisys center in Michigan, for which the vendor will seek other outsourcing customers. The move into outsourcing comes at a point when Unisys faces tough financial times and hard choices that have some users, such as those in university computing, worried about the future of the product line. **Stories, page 6.**

■ **Manufacturers Hanover begins a major downsizing effort** this week. The U.S.' eighth-largest bank is consolidating eight data centers into two to save $25 million per year and is cutting a number of IS jobs as part of a 7% overall work-force reduction. **Page 1.**

■ **The "AT&T will buy a computer company" rumor** resurfaced last week: This time it's NCR. The companies refused to comment, and analysts were skeptical, although some see significant synergies between the two. **Page 4.**

■ **An IBM Credit Corp. lawsuit** may have been the final straw that broke EDS' agreement to acquire the System One airline reservations system. ICC contended that the deal would violate the terms of its computer leases with System One — worth $80 million. ICC withdrew the suit when the acquisition was scuttled. **Page 8.**

■ **Most of the computer industry's friends in Congress** were re-elected easily, with the notable exception of Wisconsin's Robert Kastenmeier, a copyright protection advocate. Independent gubernatorial candidates from the high-tech industry finished far behind in California and Massachusetts, but they claimed they got their messages across. **Page 12.**

■ **A slew of Intel 80386SX-based notebook computers** and a plastic fiber-based Ethernet are among the products to be showcased at Comdex/Fall '90. But Ashton-Tate's long-awaited Dbase IV compiler will be available only in a beta-test version. **Pages 142, 144.**

■ **Plans for re-engineering business processes using IS** were discussed by three firms at a recent conference. Kentucky Fried Chicken, Union Camp and Scudder, Stevens & Clark are undergoing major systems revamps and/or shifts in hardware platforms. **Page 93.**

■ **If software programming is an art,** then so is the job of managing programmers. Doing it successfully requires giving developers enough free rein for creativity while harnessing their talents to ensure that business needs are met. **Page 87.**

■ **Reports on cumulative trauma disorders** are becoming an integral part of life with computers. While human resources departments have handled preventive training issues in the past, ergonomics experts see an important role for IS managers, too. **Page 138.**

■ **On-site this week:** Can IS help control skyrocketing health benefits costs? US West in Englewood, Colo., thinks so and is using OS/2-based software that analyzes a variety of external databases to provide benefits utilization information. **Page 49.** Carnegie Mellon University in Pittsburgh now boasts a 530M bit/sec. fiber-optic network, which it achieved by tailoring a Cisco Systems standard multiport bridge to act as a backbone. **Page 67.**

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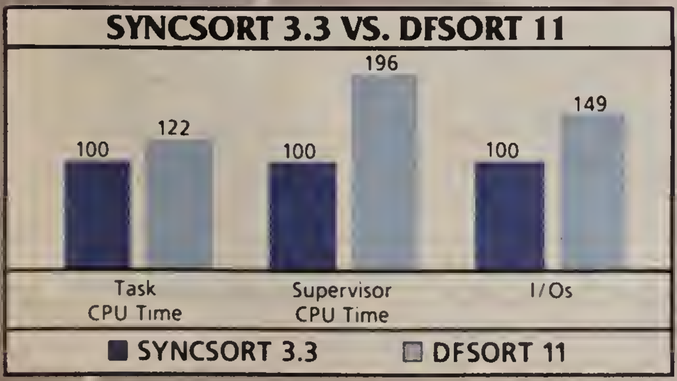

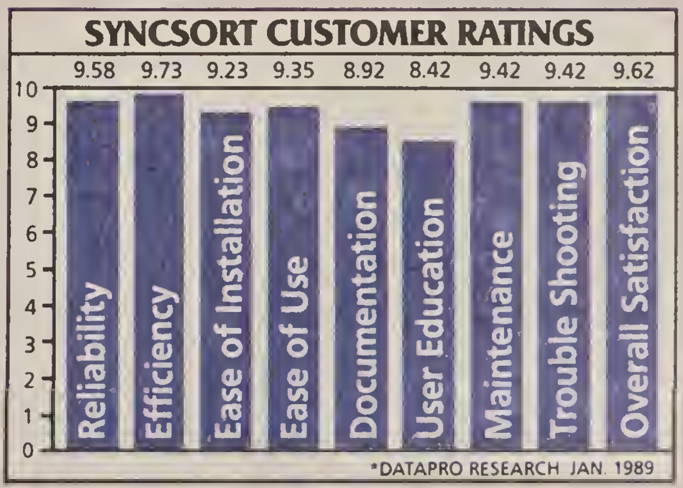

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Merger rumor bubbles to surface

Analysts skeptical of speculation about possible AT&T, NCR marriage

BY ELLIS BOOKER
CW STAFF

A published report that AT&T and NCR Corp. were discussing a merger of their computer businesses was greeted with some skepticism by computer industry analysts last week, who noted that a similar rumor had surfaced before but had failed to materialize.

AT&T and NCR spokesmen refused to confirm or deny the report, published in *The Wall Street Journal*, saying their companies had policies of not commenting on possible mergers or acquisitions.

"I'm pretty skeptical," said Judith Horwitz, vice president of Patricia Seybold's Office Computing Group in Boston. She speculated that the story could have been floated by AT&T as a trial balloon to see the reaction of the financial markets to the news. Initial reaction on Wall Street Thursday sent NCR stock soaring 12%, while AT&T stock fell only 50 cents.

Relatively well suited

However, Harvey L. Poppel, a partner at Broadview Associates, a Fort Lee, N.J.-based mergers and acquisitions company specializing in the information technology industry, said AT&T and NCR make a better match than some of the other companies that have been rumored in the past to be likely suitors of 106-year-old NCR, based in Dayton, Ohio.

"NCR is not a near basket case, like Data General, Wang or Unisys," Poppel said, adding that NCR has a strong presence in banking and retail, two areas that AT&T deems strategically important. Also, there is NCR's commitment to Unix and open systems, which maps to AT&T's computer strategy, he said.

Two other areas of synergy, he said, are NCR Comten, with front-end processor products that would give AT&T an entry into accounts now held by IBM, and NCR's international business. "AT&T has shown a very strong propensity since divestiture to sell outside the U.S.," he said, noting that more than half of NCR's sales come from outside the U.S.

NCR, Poppel said, would primarily benefit from AT&T financial muscle, which could push it into the top tier of computer companies, presently occupied in this country by IBM, Digital Equipment Corp. and Hewlett-Packard Co. and in Japan by Fujitsu Ltd.

U-nited

Any combination of AT&T's and NCR's Unix computer businesses would have little immediate impact on U.S. and worldwide market rankings

Value of Unix system shipments (in millions)

	U.S.	Worldwide
HP	$805	$1,855
Sun	$980	$1,810
DEC	$540	$1,740
AT&T	**$586**	**$638**
NCR	**$191**	**$399**
Cray Research	$440	$580
IBM	$240	$530
Other	$2,018	$5,748
Total market	$5,800	$13,300

Source: International Data Corp.

Income-ing wounded

For the first nine months of the year, NCR revenue grew 5% to $4.39 billion, but net income dropped 3% to $258 million.

AT&T does not break out revenue for its Morristown, N.J.-based Computer Systems Group, which was formed in 1984 during the divestiture of the old Bell System.

The logic of the merger rumor includes new developments at NCR, which has recently made an unprecedented commitment to a new hardware architecture, basing its System 3000 line exclusively on Intel Corp. microprocessors and Unix.

Sun finally fires competing salvo into graphics market

BY J. A. SAVAGE
CW STAFF

In last week's Sparcstation 2 announcement, Sun Microsystems, Inc. finally addressed the point that many users have fingered as its weakest — its lack of graphics hardware.

By themselves, the details of Sparcstation 2 were as predicted [CW, Oct. 29]: It runs at 28.5 million instructions per second, 21 Specmarks (a benchmark of technical applications developed by an industry consortium) and 40 MHz. But user interest appears to lie in the three graphics versions of the workstations and the graphics add-in boards for some of its earlier models.

Buried in the company's rhetoric, which casts Digital Equipment Corp. and IBM as its prime workstation market targets, the latest announcement appeared to be more precisely aimed at relatively tiny Silicon Graphics, Inc. Silicon Graphics markets workstations with proprietary graphics hardware to enhance three- and four-dimensional effects, according to analysts.

"Our guys have been starved for graphics for two or three years now," said Ed Zander, vice president of corporate marketing at Sun. In that time, workstation customers such as Thomas Lasinski, chief of the numerical aerodynamic simulation applied research office, could not wait for Sun and chose Silicon Graphics' workstations. "Their graphics were superior by a factor of three to four."

Analyst John Jones at Montgomery Securities in San Francisco said that while Sun's new graphics capabilities were nice, "they are still nowhere near the capabilities that Silicon Graphics has at the high end." He added that at the high end, Sun lacks applications: "There are about a dozen where Silicon Graphics has over 600."

However, Sun has packaged its Sparcstation 2GX, 2GS and 2GT in much smaller boxes than Silicon Graphics has.

The Sparcstation 2GX is the lowest-end graphics product for basic wire frame renderings. It consists of a board addition in the standard desktop workstation and begins at $17,995. Also in a board addition is the 2GS, capable of rendering solid models at $26,995.

Hefty graphics

The most powerful graphics computer is the Sparcstation 2GT, which has a deskside tower and starts at $49,995.

Analysts such as John Girton, at Van Caspar & Co. in San Francisco, said the prices — beginning at $14,995 for the basic nongraphics workstation — appeared high. Zander said that the company had been "guilty" in the past of advertising an entry-level price that was an unrealistic configuration and added that this time, the base price included enough memory and disk to make it a working model. He said that as such, the workstation is actually close to the price of the earlier Sparstation 1+ models, which listed at a base price of $8,995.

In addition to the new workstations, Sun will upgrade existing Sparcstation 1s and 1+s with its graphics boards and CPU. A Sparcstation 1 or 1+ upgrade to a Sparcstation 2 will cost customers $6,995, according to the company. Users will have to trade in their "pizza box" and receive a new one with 16M bytes of memory (up from 8M bytes) and a new CPU. Putting the GX graphics accelerator on a Sparcstation 1 or 1+ will cost $3,000 and consist of a board swap.

"In most cases, we'd upgrade instead of buying a Sparcstation 2," said Hank Larabell, manager of project control at Stanford University. Larabell has more than one dozen Sparcstation 1s and 1+s. At list price, the upgrade will cost Larabell $1,000 more than what it would cost to buy a new Sparcstation 2.

Zander said that Sun will continue to offer Sparcstation 1s and 1+s but expects demand to be "quite small."

Bundled with each product is a compact disc with a software catalog. Users can peruse available software and, if they wish to purchase it, can contact the software company by phone to find out how to unlock it for use.

Racing form

Sun's Sparcstation 2 almost doubles the speed and performance of Sparcstation 1+

	Sparcstation 1+	Sparcstation 2
Performance	10.0 Specmarks 15.8 MIPS	21 Specmarks 28.5 MIPS
Processor	25-MHz Sparc	40-MHz Sparc
Main memory	8M-40M bytes	16M-96M bytes
Disk capacity	104M bytes - 2.7G bytes	207M bytes - 7.6G bytes
Base configuration	8M-byte memory; 17-in. monochrome monitor; no hard disk	16M-byte memory; 1-in. monochrome monitor; 207M-byte hard disk
Base price	$8,995	$14,995

Source: Sun Microsystems, Inc.

CW Chart : Doreen St. John

CORRECTION

The size of a recent network management outsourcing contract between Digital Equipment Corp. and W. H. Smith was reported incorrectly in the Nov. 5 Integration Strategies section. The correct size of the five-year contract is $28 million.

In the Oct. 15 issue of *Computerworld*, Programart's Strobe DB2 Feature should have been referred to as an updated release. The product is part of the Strobe Application Performance Measurement System product family. Free upgrades are offered only to current users of Strobe DB2 Feature.

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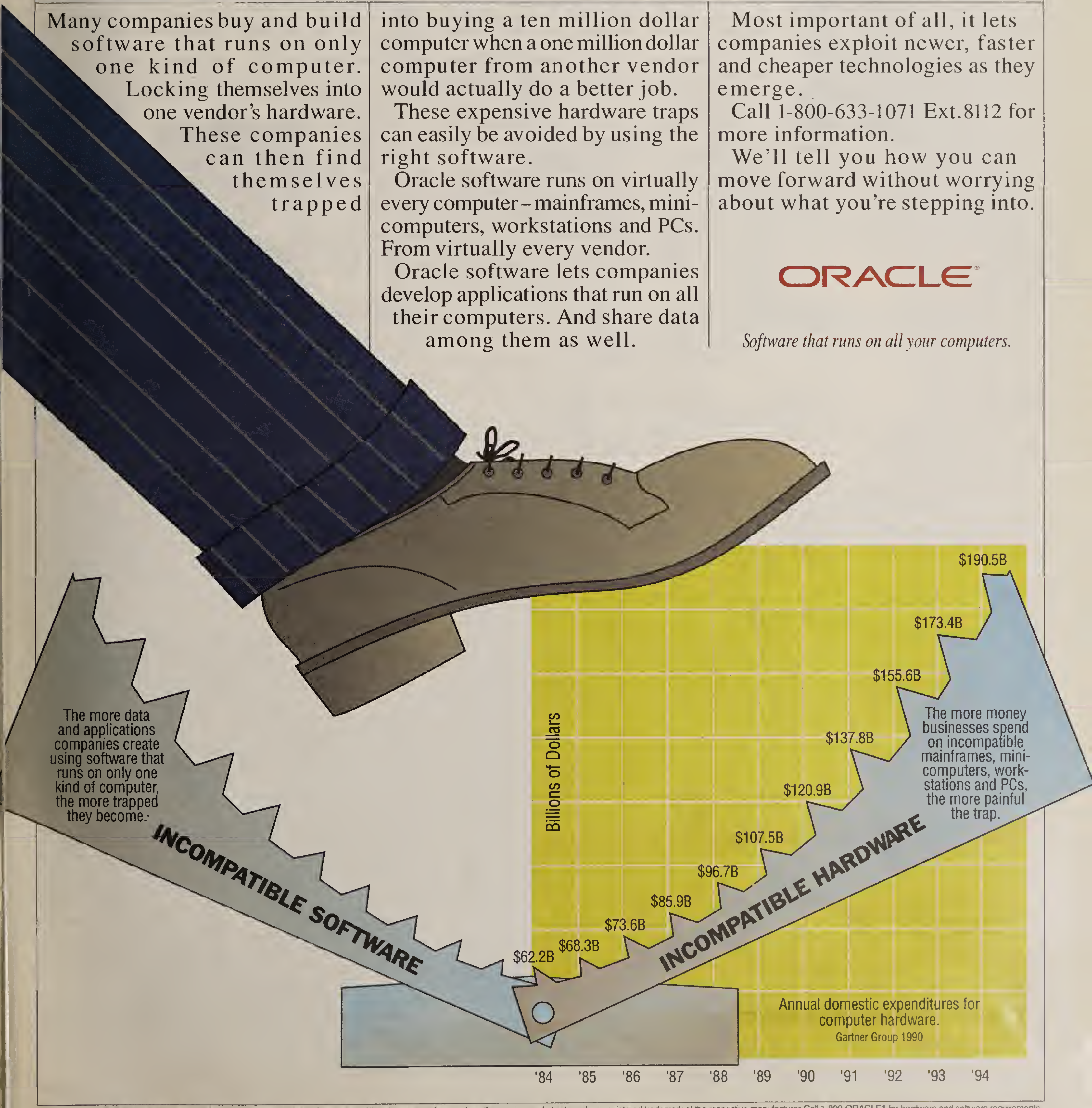

Annual domestic expenditures for computer hardware.
Gartner Group 1990

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Ford drives into Unisys camp

BY ELLIS BOOKER
CW STAFF

DETROIT — Unisys Corp. won its first private-sector outsourcing contract last week, inking an agreement with Ford Motor Co. to handle computer operations from a central data center supporting several of the carmaker's divisions.

The three-year deal with Ford — worth tens of millions of dollars, according to Unisys sources — suggests that Unisys wants to expand its outsourcing business, which up until now has been confined to government work.

Unisys' Slotkin *cites experience*

"Unisys and predecessors have been doing computer facility management and data center services for many years," said Arthur L. Slotkin, vice president and general manager of the firm's Systems Support Division in Unisys' U.S. Information Systems Group.

The Ford deal, while Unisys' first in the commercial sector, is not its largest outsourcing contract. Since 1974, Unisys has held a $25 million-per-year computer facility management contract with the Environmental Protection Agency, and it has run the National Aeronautics and Space Administration's scientific computers since 1967.

"We look at this as part of our overall corporate strategy," Slotkin said. "You can't be in the hardware or software business without providing these services."

Like IBM and other large computer hardware vendors, Unisys has acknowledged that the professional services market is where much of its future growth will be and is aggressively pursuing this opportunity, said Doug Wilder, manager of systems management programs at Input, Inc., a subsidiary of market research firm Input in Vienna, Va.

Another benefit to Unisys, he said, is that systems operations contracts are, by their nature, long-term arrangements. "They can provide very steady and predictable cash flow," he said.

The three-year Ford contract calls for Unisys to provide hardware and systems software maintenance, systems integration, network support and subcontractor management.

Unisys will consolidate Ford data centers that now support Ford's Troy, Mich., center and the Technical Systems and Operations Data Center in Dearborn, Mich., moving them to a new Unisys data center in southeast Michigan.

About a dozen current Ford information systems employees will be hired to help staff the new data center, which will contain Unisys' new high-end A16 mainframe as well as a dual-processor A15 and an A3 processor.

The new data center will be a shared facility, according to Slotkin, who said Unisys is negotiating outsourcing deals with other commercial clients.

Ford, which declined to discuss details of the outsourcing contract, said in a statement that the arrangement will allow it to "concentrate on the development of core information technology systems."

Winnowing out in store for Unisys product lines

BY JEAN S. BOZMAN
CW STAFF

SEATTLE — Unisys Corp. is going to have to make some hard choices about which product development and marketing programs survive its recent economic downturn, Unisys Chief Executive Officer James Unruh told a meeting of 1,000 Unisys mainframe users.

Faced with an economic downturn and the prospect of an unprofitable fourth quarter, Unruh said he would try to protect all vital research and development projects.

Unisys' Unruh *faces tough choices*

The Blue Bell, Pa., firm just announced a $356.8 million loss for the third quarter and said that it would cut its 75,000-member staff by 5,000 by mid-1991 [CW, Oct. 29].

"We will trim [research and development] programs that we don't think are leading to any kind of demand," Unruh said.

The majority of those interviewed in the crowd of users seemed content to stick with their Unisys — formerly Sperry Corp. — 1100 and 2200 proprietary mainframe systems. However, it was easy to find users who are planning to eventually migrate from the proprietary Unisys architectures.

"The federal government won't let Unisys die," said one federal employee based in Maryland, referring to Unisys' strong government systems installed base.

Unruh's remarks about corporate priorities apparently unsettled some longtime users. Following Unruh's speech, several large-site users stepped to the microphone, posing tough questions to the newly appointed top executive — and getting some surprising answers. "There is a perception that the corporation has written off the higher education market," said Rick Miller at the Baylor College of Medicine in Houston. "Unisys has no presence at all in academic research."

Instead of making a promise to strengthen Unisys' commitment to academic markets, however, Unruh responded by saying, "We can't do it all . . . because then we would start to starve everything just a little bit."

Unisys faces a credit crunch, prompting three major credit rating firms to downgrade investment ratings for the company last month. Unruh said that the firm's debt service alone was pushing the company into unprofitability.

Industry observers said they believe the situation may worsen in 1991. Some Wall Street analysts have said Unisys may have already used $300 million of its $1.25 billion credit line, which will be supported by a syndicate of 20 banks worldwide until January 1993.

DEC

CONTINUED FROM PAGE 1

earliest before it is fully in place.

The Information Network will scoop a few existing products — such as DEC's VIDA for DB2 access product and the RDBaccess tools for Oracle Systems Corp.'s database management system — under its umbrella as well.

Ultimately, it is supposed to allow users to transparently access database management systems from IBM, Oracle, Ingres Corp. and other third-party vendors.

While IBM is clearly the contender in this fight, "coexistence" was the word on many customers' lips last week as they watched DEC put its database stake in the ground (see story below left).

"They will have to coexist somehow," said John Brauckesieker, director of information systems at Protein Technologies in St. Louis, a new DEC-based manufacturing subsidiary of Ralston Purina Co., a stronghold of IBM and Amdahl Corp. mainframes. "As more and more large companies like ourselves move certain divisions to different platforms, we have to maintain what we have in-house already. IBM and DEC don't want all-out war."

Challenge to IBM

The Information Network plan not only underscores DEC's keen desire to shake off its minicomputer vendor label and be seen as both a system software company and a multivendor network integrator, but it also represents DEC's most ambitious challenge to IBM in the software arena.

"We should call this the Battle of the Imaginary Titans," quipped Elven Riley, vice president of technology planning at the Investment Banking Division of Manufacturers Hanover Trust Co. in New York. "It will be quite some time before DEC or IBM have anything other than the standard kind of bolted-together tool sets that exist today."

Whether corporate customers want to lock into yet another proprietary database system may not become an issue, some users said, if DEC's fervent promises of open standards compliance are met.

"A key issue for me is whether I can develop on a DEC system and then move the [application programming interface] to other platforms independent of DEC," Riley said. "It's just not clear yet if they can do that."

The multivendor nature of today's business computing environment makes the DEC strategy all the more attractive, several users said.

"There are very few major companies that are not mixed shops," said William Anderson, chief information officer at Prudential-Bache Securities in New York City. "In that environment, the easier a vendor makes it to interrelate, the more that becomes an advantage."

Even for companies such as Citicorp, which chose Sybase for its main database two years ago, the notion of interoperability between databases is "clearly attractive and something we would look at," said an IS manager who asked not to be identified. "DEC is definitely going in the right direction."

With the advent of object-oriented technology, database repositories will become far more than warehouses for data, data definitions and screen formats. They will also hold original analysis and design for all of a company's crucial applications.

"Ideally, a company ends up with one repository, or two that coexist happily," said Wes Melling, an analyst at Gartner Group, Inc. in Stamford, Conn. "Either DEC or IBM is going to have to build a really rich bridge between their two repositories — and the likelihood is it will be DEC building it."

In the meantime, DEC will attempt to do for its RDB/VMS relational DBMS what IBM did for DB2 on the MVS mainframe operating system, several analysts and customers agreed.

RDB reach-out

DEC extended the reach of its RDB relational database last week and unveiled object-oriented products for application development and database management. Introduced were the following:

- RDBaccess for Oracle on VMS provides an RDB/VMS SQL gateway that enables direct read access to Oracle databases on VMS systems. Priced from $1,130 to $47,100, it begins shipping this month.
- RDBaccess for RMS (flat files) on VMS includes a non-SQL data server and a VAX RMS driver that contains code for addressing RMS files and obtaining low-level access to VSAM data sets on IBM systems. Priced from $900 to $37,680, it will be available in spring 1991.
- DEC's Trellis Object System for application development features an object-oriented language, tools and compiler support for object-oriented programming. It will be available in December at $5,000 per workstation user license.
- Objectivity/DB, an object-oriented DBMS from Objectivity, Inc. will be jointly offered by DEC and Objectivity in January 1991 for VAX/VMS, VAX/Ultrix and RISC/Ultrix platforms. It costs from $3,000 to $25,000.
- Version 2.2 of VAX Data Distributor, allows users to add data from multiple sources such as Oracle and IBM DB2 databases. It is available this month, priced from $930 to $59,761, depending on the size of the system.

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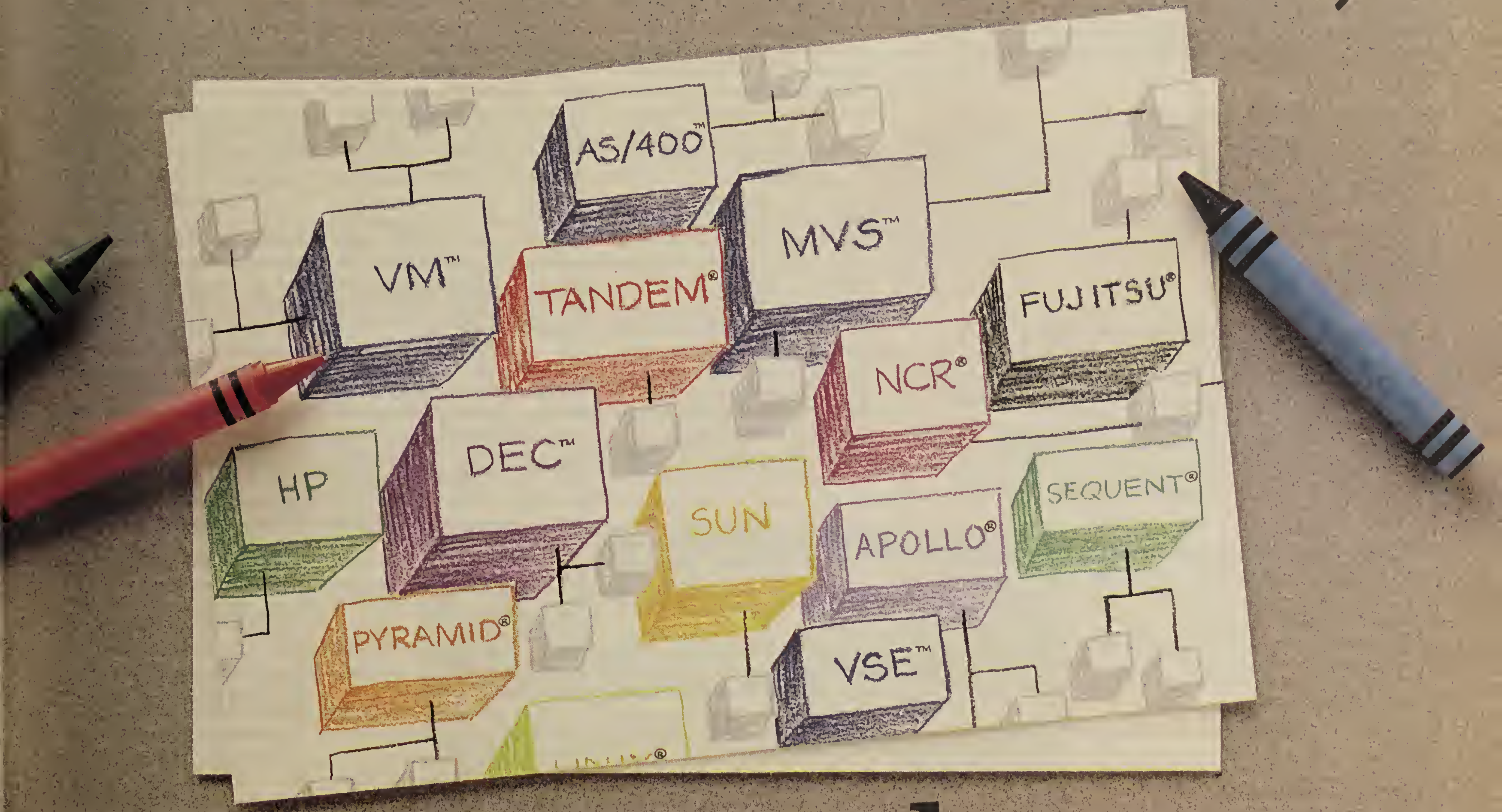

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NEWS SHORTS

Morris appeal due

A federal appeals court in New York will hear arguments on Dec. 4 in the case of Robert T. Morris, convicted of writing and releasing a worm program on the Internet network two years ago. Morris, meanwhile, has been answering telephones at the Boston Bar Association as a court-ordered community service. A federal judge sentenced Morris, who lives in Cambridge, Mass., to 400 hours of community service and three years of probation. He was fined $10,000.

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Wang, Banyan sign pact

Lowell, Mass.-based Wang Laboratories, Inc. and Banyan Systems, Inc. in Westboro, Mass., have reached an agreement whereby Wang will market, sell, service and support Banyan's Virtual Networking Software network operating system products on a worldwide basis. This partnership reportedly makes Wang the first global reseller of Banyan's microcomputer networking products.

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Integrated telephony testing

IBM, Northern Telecom, Inc., Nynex and Syracuse University will be jointly exploring the feasibility of using Centrex service to extend the benefits of computer-integrated telephony to customers who cannot afford their own private branch exchange, the vendors said. IBM and Northern Telecom have been working on a link between IBM's Application System/400 hosts and Northern Telecom's DMS 100 Supernode switch.

……

New trans-Atlantic cable planned

MCI Communications Corp. and British Telecommunications PLC said they will build the largest undersea cable ever, a fiber-optic cable to link North America and Europe at rates as high as 2.4G bit/sec. The firms said they will use synchronous optical network transmission technology, which can support 150,000 calls per fiber pair and which provides sophisticated management capabilities, including centralized control of circuit provisioning, maintenance testing and cable restoration.

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1-2-3 a la LAN

Lotus Development Corp. last week shipped the server and node network editions to 1-2-3 Release 3.1, which allow users to install, manage and share 3.1 files, data and printers on a network. Features include password protection, file reservations and the ability to seal files with a password so that spreadsheet templates and macros can be easily distributed on the network. Network management tools in the Server Edition reportedly give network administrators greater control over the installation and management of 1-2-3 on the network.

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Microsoft sued

A small Pomona, Calif.-based distribution firm has filed an antitrust complaint againt Microsoft Corp., charging that the software giant is trying to muscle it out of the mouse input device market. The action was filed by Z-Nix Co., a distributor for Taiwan's Jow-Dian Enterprises, which was in the midst of a deal to bundle its mouse with Microsoft's Windows 3.0 operating environment. Spokesman Frank Yeh said Z-Nix had agreed in principle to a royalty rate and that Microsoft later doubled that rate. Z-Nix claims it has lost more than $1.5 million in business.

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Nynex trims subsidiary

Nynex Corp last week announced the sale of Telco Research Corp., which it had acquired in 1986, to several Telco Research officers for an undisclosed amount. Telco Research develops and markets software and services for managing telecommunications and information systems. The sale frees Telco from the restrictions of the Modified Final Judgment, which divested the Bell System. Nynex and Telco have been sued by Scott Rafferty, a former vice president, who claims he was fired after questioning whether some Telco activities overstepped the bounds of a government waiver.

More news shorts on page 142

EDS ponders System One setback

Oil price increases and an ICC lawsuit killed Continental deal

BY NELL MARGOLIS
CW STAFF

Two unforeseen obstacles derailed the potential $4 billion outsourcing and equity partnership deal between Electronic Data Systems Corp. (EDS) and Continental Airline Holdings, Inc., according to spokesmen for both parties last week: Spiraling fuel prices triggered by the hostilities in the Mideast and spiraling legal hostilities from IBM Credit Corp. (ICC).

The latter, several sources said, could force EDS to reassess its recent strategy of taking an equity position in client companies that outsource.

The deal, hailed for its scope and creativity when it was announced last February, began to unravel in its final scheduled days of negotiations as oil price hikes edged struggling, highly leveraged Continental into precarious financial status — the brink of bankruptcy, according to some reports. "The health of the customer was on the line," said Charles E. Taylor Jr., an analyst at Prudential-Bache Research. "EDS had no choice but to back out of the deal as it stood."

According to an EDS spokesman, however, ICC dealt the firms no less of a deal breaker. In a lawsuit filed three days before the contemplated Nov. 2 closing of the EDS/Continental alliance, IBM's computer leasing subsidiary charged that General Motors Corp.'s information systems subsidiary and its would-be partners were attempting to fraudulently transfer beyond ICC's reach some $80 million of IBM hardware that was serving as collateral for financing agreements between System One, Continental's reservation systems division, and ICC.

"The . . . transfers, if made, will constitute defaults under the terms of the [ICC] agreements," said ICC in a suit filed Oct. 30 in Dade County, Fla., that sought to enjoin the EDS/Continental deal and recover monetary damages as well. "The defaults will trigger remedies." Such remedies would include immediate acceleration of the $80 million debt plus repossession of the equipment, ICC said.

Legal shock

The eleventh-hour legal assault came as a shock to System One, said a spokeswoman for the airline reservation organization. ICC, she said, first aired its objections in September before the federal bankruptcy judge sitting on the proceedings involving original System One owner Eastern Airlines. Although the bankruptcy court dismissed ICC's complaint as irrelevant to the issue before it, she said, EDS and System One took the IBM subsidiary seriously indeed.

"We had every intent to go the duration with IBM Credit," she said. "Their interests were not being undermined or abandoned; we spent untold business hours assuring them of that." In addition, both she and an EDS spokesman said, a bankruptcy court stipulation that at least $175 million worth of the proceeds of the proposed deal — which contemplated EDS' purchase of a 50% stake in System One for $250 million in cash — be held in escrow pending resolution of creditors' claims would have protected ICC.

ICC, which formally withdrew the suit when the EDS/Continental deal collapsed, refused to comment. "It's history," an ICC spokeswoman said.

EDS intends to ensure that it remains so. "We still want to get into the airline reservation area, and we still view Continental as the best possibility for a partnership of some kind," said the EDS spokesman last week, as the firms attempted to pick up the pieces of its shattered relationship and assess what could be put back together. "We're not ruling out anything." However, in light of the lawsuit, when the new deal emerges, it is unlikely to cast EDS as a Continental stakeholder.

Even as it continued to explore the remaining options for a move into the airways, EDS advanced its spread across Europe with an approximately $300 million, 10-year contract to manage IS and develop applications for Sweden's Saab Automobile AB. The contract, which sets new outsourcing frontiers for Sweden, will bring some 250 Saab employees to EDS but will involve no equity transfer.

Bull

CONTINUED FROM PAGE 1

occurred during the first 10 months of 1990, the company said. Bull now employs 47,000 worldwide and 7,800 in the U.S.

The company issued a statement saying that it expects the "effect of this crisis" to be a net loss before exceptional charges of about $180 million for the second half of 1990, which follows losses of $331 million for the first two quarters of the year.

Kidd lists the impending 1992 European economic unification, the current oil crisis and the overall computer industry ills as compounded reasons triggering Bull's reaction.

Playing to the global economy and internal needs, Groupe Bull Chairman and Chief Executive Officer Francis Lorentz outlined the firm's transformation plan, which includes first-time restructuring of worldwide research and development with a unified budget under the direction of Roland Pampel, president and CEO of Bull HN, headquartered in Billerica, Mass.

According to Pampel, this is basically a formalization of duties he has been performing for about two months.

Dan Cavanagh, senior vice president at Metropolitan Life Insurance Co. in New York and longtime Bull customer, expressed enthusiasm at Pampel's appointment, adding that he was encouraged to see that the company was increasing research and development spending in the wake of other cost-cutting procedures.

"Pampel is the guy on the hot seat now," said George Colony, president of Forrester Research, Inc., a market research firm in Cambridge, Mass. "He has about 12 to 18 months to make a go of it."

Other elements of Bull's transformation plan include the following:

- Manufacturing operations will be consolidated from 13 plants to six plants by the end of 1992 and will include sites in France, Italy and the U.S.
- Acceleration of its long-term R&D program to implement a unified architecture, combining the GCOS and Unix operating systems. The $2 billion project will be funded through a multiyear contract with the French government.
- The R&D budget for Zenith Data Systems will be increased 25% over current levels.
- A new European management structure, including Italian and British operations, under the direction of Didier Ruffat, president and CEO of Bull SA. French operations will remain under the direction of Jean Claude Albrecht, who will also head worldwide manufacturing.

Colony applauded Bull's consolidations and cutbacks, given that the company "has been too spread out in R&D and has maintained too many manufacturing sites. I think they were oversupplied, and this strategy will give them a more cohesive product line."

According to Lindamood, the big questions remain as to whether Bull will have the staying power to see the transformation all the way through, and, given that, whether they actually have the expertise to blossom in a competitive Unix market.

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CAD conferencer debuts

BY ELISABETH HORWITT
CW STAFF

DETROIT — A computer-aided design (CAD) conferencing product, which Intergraph Corp. and Databeam Corp. are expected to jointly announce today, reportedly allows as many as eight Intergraph workstation users at different sites to concurrently review, mark up, annotate and sign off on the same CAD image, just as if they were all at the same table.

Databeam's Computer-Aided Design Conferencing Module for Intergraph workstations, to be announced at the Autofact '90 conference here, is said to distribute the same high-resolution image to as many as eight workstations and then synchronize the screens. Each workstation is equipped with a graphics pad and stylus, which can be used to mark up or annotate the image on a screen with changes showing up immediately on the other remote screens, according to Databeam Vice President Neil Starkey.

Boeing Defense & Space Group in Huntsville, Ala., is considering Databeam's new product. "In the environment we work in, the designer builds the drawing, and then an engineer marks it up with a red pencil, pointing out errors, making comments and corrections," said Louie Weed, manager of information management for the group. "It would be a gain in productivity if the two could work interactively and the designer could reincorporate [the engineer's changes] in real time, almost like a dynamic update," Weed added.

The Intergraph conferencing module will also interface with Databeam's existing conferencing module for IBM Personal Computers, enabling Intergraph users to interactively work on documents with PCs running graphics software, Starkey said.

Databeam plans to migrate the conferencing module to "all major [graphics and engineering workstation] platforms," Starkey said, declining to name the vendors or an introduction time frame. This would provide the first product to support both CAD conferencing and "lossless" image transfer across different vendors' platforms, he added.

The Databeam conferencing module for Intergraph's Series 300, 3000 and 6000 workstations is available now and is priced at $10,995, including graphics pad, stylus, software and a communications board that supports transmission rates as high as 2M bit/sec. The communications board can interface with a variety of networking devices, including an Integrated Services Digital Network port, Starkey said. A separate unit for synchronizing screen images on as many as eight systems is priced at $25,000.

Siemens U.S. unit merged

BY ELISABETH HORWITT
CW STAFF

BOCA RATON, Fla. — In an attempt to take undisputed third place in the U.S. central office switch market, Siemens AG and GEC Plessey Telecommunications announced last week that they would be merging their respective U.S. central office switch operations into a single, jointly held company.

The 50/50 jointly owned venture, to be named Siemens-Stromberg-Carlson, will merge Siemens Communication Systems, Inc. with Stromberg-Carlson, a GEC Plessey subsidiary whose stock is 40% owned by Siemens. Although final details have yet to be worked out, the two subsidiaries began operating as a single unit last week, according to E. Van Cullens, vice president of marketing and business development at the new venture.

"We accept that AT&T and Northern [Telecom, Inc.] are dominant shareholders of this market and won't be displaced easily," Cullens said. "We want to be undisputable No. 3." While Stromberg ranks third and Siemens fourth in the U.S. market, "no one has been able to break out of the pack," he added.

"Let's put it this way: If they didn't do what they did, I wouldn't like their chances," said Peter Bernstein, a senior analyst at Probe Research, Inc. in Morristown, N.J. "It takes a lot of money to sustain central office switch development, and this gives them economies of scale for both their lines."

The merger should also enhance the companies' appeal to regional operating companies, "who like doing business with people who'll be around," Bernstein said.

Siemens' two major customers are regional holding companies Bell Atlantic Corp. and Ameritech, with "some initial penetration" into Bellsouth Corp. company Southern Bell, while Stromberg-Carlson sells to South Central Bell, Pacific Bell and some independent telephone companies. Siemens' EWSD central office switch is "optimized for the high end," and Stromberg-Carlson's switch targets low- to midrange systems, Cullens added.

While the companies have no plans to merge their two product lines entirely, they plan to "work toward commonality" of their respective switching products "wherever it makes sense," Cullens said.

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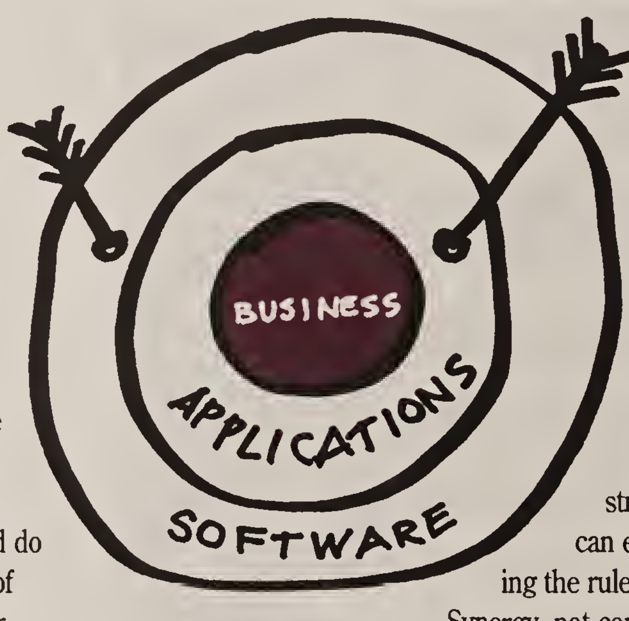

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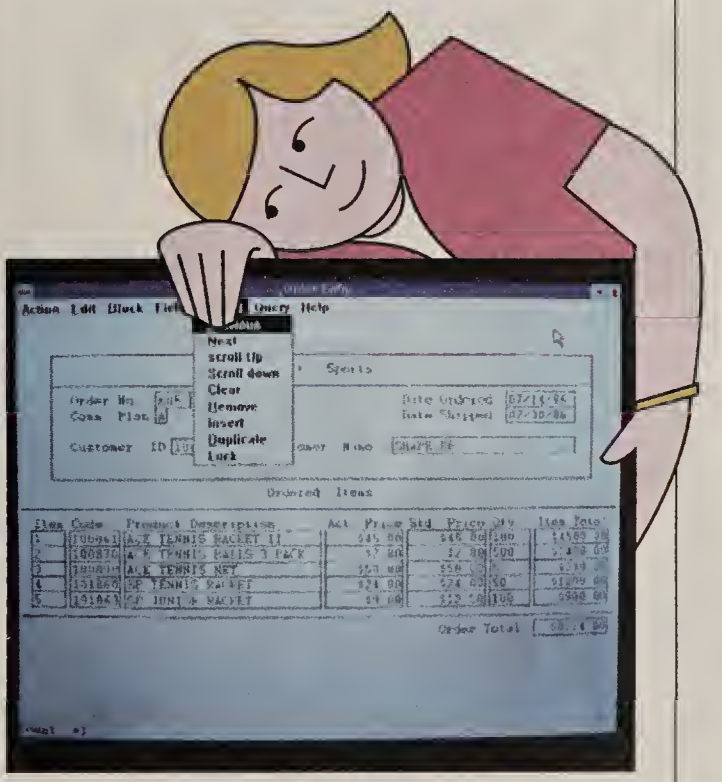

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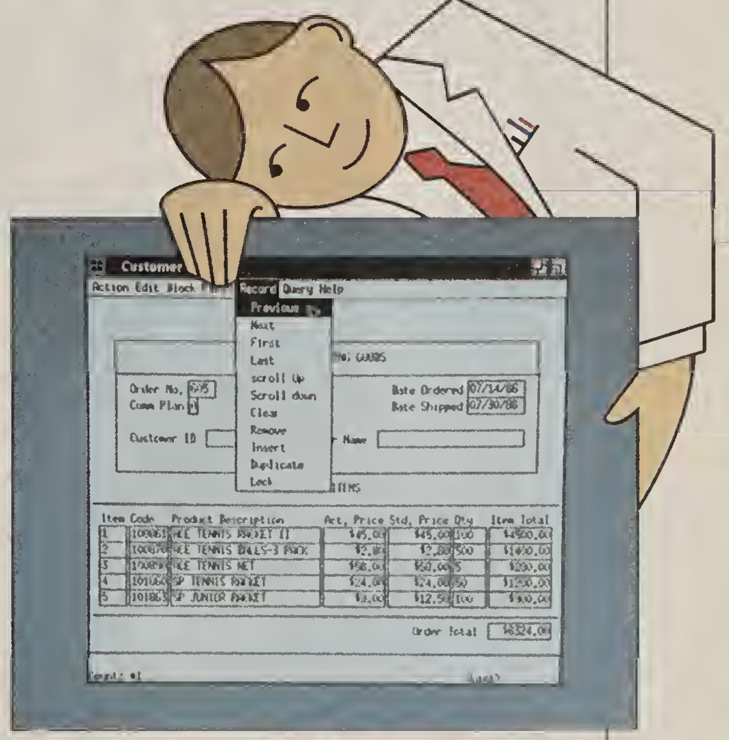

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Many technology industry friends win election

BY MITCH BETTS
CW STAFF

WASHINGTON, D.C. — Most of the computer industry's friends in the U.S. Congress won re-election by landslide margins last week, but two key subcommittee chairmen were victims of voters' anti-incumbent mood.

Reps. Robert W. Kastenmeier (D-Wis.) and Doug Walgren (D-Pa.), who had been involved in computer-related legislation during the last decade, lost to Republican challengers in Tuesday's elections.

Kastenmeier, who had served 32 years in the House, was the House copyright expert as chairman of the House subcommittee dealing with intellectual property issues. He played a major role in the passage of several industry-supported bills, including the Semiconductor Chip Protection Act of 1984 and the Electronic Communications Privacy Act of 1986.

"We hope the next chairman is as strong a supporter of copyright protection for software" as Kastenmeier was, said Ted Heydinger, vice president of government relations at the Computer and Business Equipment Manufacturers Association (CBEMA).

It is not yet clear who will replace Kastenmeier as the subcommittee chairman, although Rep. Mike Synar (D-Okla.) is next in seniority.

Walgren, a seven-term incumbent, was edged by Republican Pittsburgh lawyer Rick Santorum 51% to 49%, because of the anti-incumbent mood in a traditionally Republican district. He was chairman of the House subcommittee on commerce and competitiveness and an advocate of bigger budgets at the National Institute of Standards and Technology.

Other incumbents considered friends of the computer industry — as winners of CBEMA's Public Policy Award — won re-election last week by big margins. These winners included Sen. Max Baucus (D-Mont.) and Reps. Robert T. Matsui (D-Calif.), Hamilton Fish Jr. (R-N.Y.), Don Edwards (D-Calif.), Frank Horton (R-N.Y.) and J.J. Pickle (D-Texas).

However, industry lobbyists hoping to boost the number of Republicans in the Senate were disappointed by the defeats of Sen. Rudy Boschwitz (R-Minn.) and GOP challengers Lynn Martin in Illinois and Claudine Schneider in Rhode Island [CW, Oct. 29].

The regional Bell holding companies lost one of their most ardent supporters when Rep. Thomas J. Tauke (R-Iowa) lost his hard-fought campaign to win the Senate seat held by Sen. Tom Harkin (D-Iowa). Tauke will not be returning to the House, where he was a sponsor of legislation freeing the Bell companies from court-ordered business restrictions.

Vote IS

While their final vote tally registered a mere blip on the electoral radar screen, a pair of computer company executives who waged long-shot independent campaigns for the governors' seats in Massachusetts and California said they scored an ideological victory because they advanced ideas that will survive well past Election Day.

"I think we did very well for non-politicians getting into politics," said Len Umina, a Digital Equipment Corp. technologist in Maynard, Mass. Umina's Independent High-Tech Party candidacy finished third in a three-person race behind Republican victor William Weld and Democratic runner-up John Silber and claimed to have secured about 3% of the vote. His campaign called for a central governmental information repository that could be accessed by a home computer.

In California, Libertarian Party candidate Dennis Thompson garnered 135,101, or approximately 2%, of the votes cast, finishing third in a five-way race behind Republican winner Pete Wilson and Democratic candidate Dianne Feinstein. Thompson, who heads the Epicom, Inc. software house in San Diego, said he wanted to eliminate all business taxes as a way to foster innovation and regain the U.S.' slipping technological leadership.

Despite the setback, Umina and Thompson have vowed to continue their fight. Thompson had previously entered several political contests, while Umina promised to continue his push for his Public Access Computerization (PAC) database network. "I'd like to one day be known as the father of PAC," Umina said. "That would be a much more important contribution than holding any political office."

JAMES DALY

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Database to aid East Bloc managers

NEW YORK — The Berlin Wall may have come tumbling down, but Eastern European nations still need an information bridge to match their management needs with Western services that meet them.

That is the idea behind the World Management Council's plan to develop and run a database to help Eastern Bloc nations educate and train managers for private and public sector organizations. The plan, unveiled last month, calls for the establishment of a "computerized clearinghouse" to match U.S. and Western European management training providers with Eastern European organizations.

The developing economies of Eastern Europe "have identified the critical need for such a database," said George Chall, executive secretary of the World Management Council. The council, currently headed by Diebold Group, Inc. founder John Diebold, is a federation of management institutes in 44 countries.

Issues such as what type of host computer will be used and where it will be located will be decided by a task force being set up now, Chall said. The projected two-year cost to implement the database is about $700,000, to be provided by U.S. government funds earmarked for Eastern Bloc development and private sources.

CLINTON WILDER

Downsizing

CONTINUED FROM PAGE 1

its overall work force by 1,400 people, or approximately 7%, with some of those reductions falling on IS, Nyce said. The actual IS numbers and time frame have not been made public.

Users have experienced little or no impact, either from the present consolidation effort or from an earlier, much smaller scale consolidation of the wholesale banking data center, according to Jack Egan, a senior vice president in charge of global custody who experienced both reorganizations.

"I think they've done a real good job," Egan said. "Support is essentially from the same people, and if my costs go down, I'm all for it."

Initiated in the 1986-87 time frame, the first consolidation "netted us annual savings of $15 [million] to $16 million a year," Nyce said.

That experience has "spurred on" the current effort, which spans the entire corporate data center operation and is "an order of magnitude or two greater" in complexity, Nyce added. It also aims at much higher paybacks.

While data center operations costs should be flat or slightly lower next year, Manufacturers Hanover expects the consolidation to realize savings of $10 million to $11 million in 1992 and $20 million to $30 million per year by 1993, Nyce said.

Minimized effects

Nyce and his people have employed several strategies to minimize the consolidation's ill effects on users and data center employees, he said, including "a tremendous amount of planning," involving management early on and keeping employees informed.

In addition, the "O-word" — outsourcing — was never a serious threat at Manufacturers Hanover, so the firm never had to face the kind of employee panic that cost Merrill Lynch & Co. a number of valuable people during the past year, Nyce said. "We may consider it again in a few years, however."

THE "O-WORD" was never a serious threat at Manufacturers Hanover.

"We discussed outsourcing with IBM, Electronic Data Systems and Perot Systems, but I think management felt we could achieve the same or better results ourselves, and we worked too many years on building up skills to hand it all over to a vendor," said Steven L. Sheinheit, a senior vice president who heads the new structure under Nyce.

In April, two months after top management approved the plan, Nyce set up a project office and brought in various top Manufacturers Hanover managers to take responsibility for studying the project's feasibility and designing the Wilmington data center.

The reorganization will result in a single data center management structure across Manufacturers Hanover. Historically, each business group has had its own data center operations staff.

Manufacturers Hanover actually began a gradual consolidation of its overall operations six years ago, according to Mark Lynch, an analyst at Bear Stearns & Co. From 1984 to 1989, bad debts and other financial troubles caused the firm to shrink its organization by about one third and its assets from $76 billion to $60 billion, he added.

Hand in hand with the data center moves, Manufacturers Hanover plans to get its somewhat chaotic networking house in order by consolidating what is now a hodgepodge of T1, packet-switched, microwave and other types of links into a single network architecture. This network will be managed by a consistent, centralized network management system, database and accounting structure.

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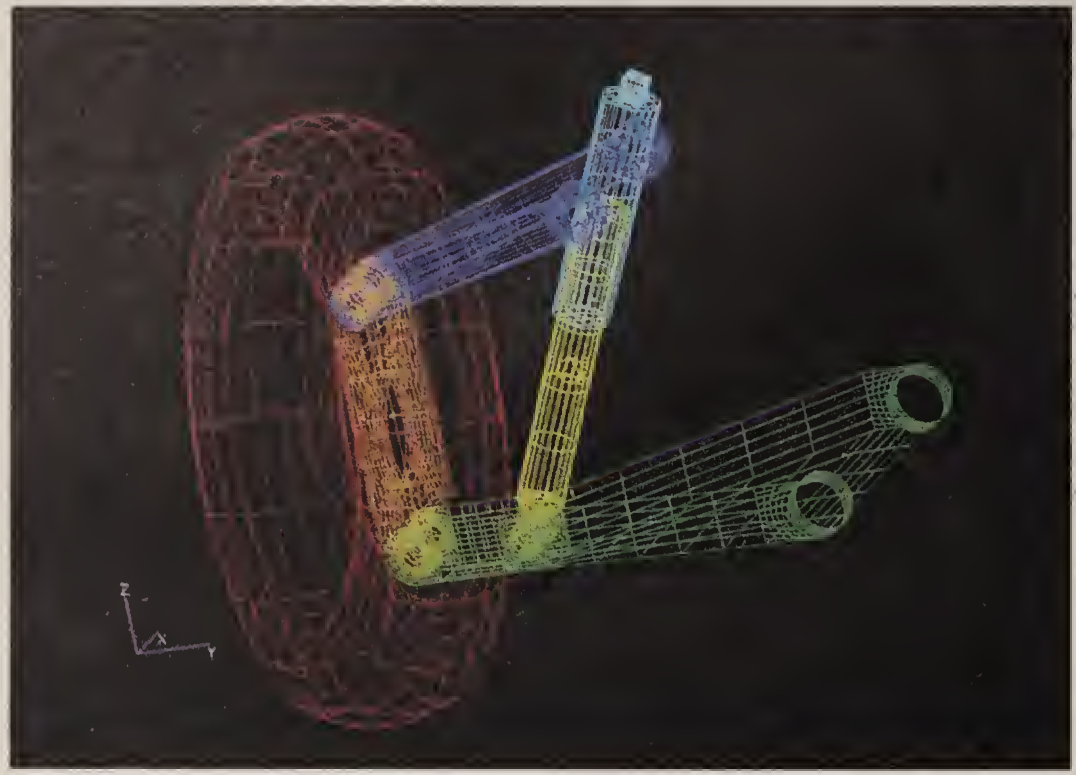

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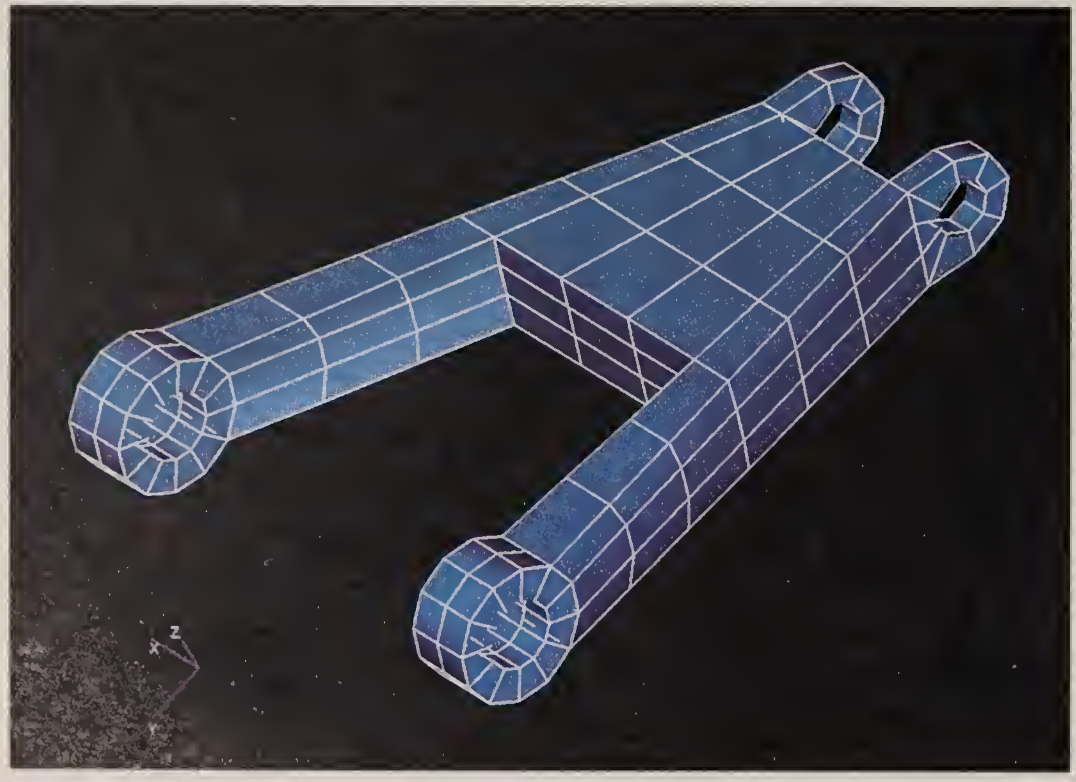

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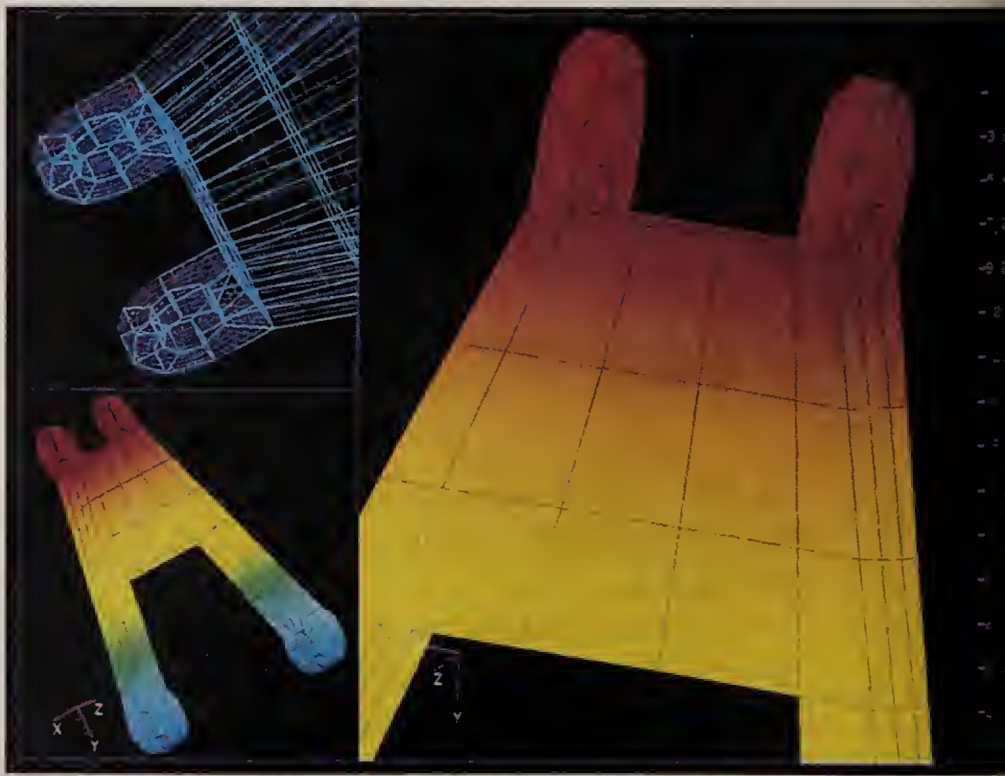

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‘Finger hackers’ charged with voice-mail crime

BY MICHAEL ALEXANDER
CW STAFF

NEW YORK — State police and the U.S. Secret Service arrested a pair of alleged “finger hackers” last week on charges of illegally tampering with a voice-mail system belonging to International Data Group/Peterboro, a sister company of *Computerworld*.

The pair used a programmable memory telephone to repeatedly enter the voice-mail system, change passwords, delete messages as well as leave bomb threats and other harassing messages, according to John Keary, New York state police investigator.

Keary said a two-month investigation led police and Secret Service agents to Daniel Rosenbaum, 17, and a 14-year-old cohort, whose identity was withheld because of his age.

The teenagers, who reside on Staten Island, were charged with computer tampering, unauthorized use of a computer and aggravated harassment.

“Evidently, the 17-year-old initiated the attacks,” Keary said. “He apparently subscribed to *Gamepro* [an IDG/P publication for video game players] and was supposed to get a free poster. He became angry when he did not get the poster and felt that he was getting the shaft.”

The illegal tampering caused the loss of hundreds of messages, including instructions by clients to place advertisements in IDG/P publications, according to Olga Greenwood, a telecommunications systems analyst and administrator at IDG.

Greenwood calculated that the company lost $2.4 million in revenue as a result of the attacks. She added that the voice-mail system was taken out of commission for 18 days in order to repair the damage caused by the hackers.

The two teenagers were released to the custody of their parents. Rosenbaum is expected to appear in Staten Island Criminal Court on Dec. 17 to respond to the charges. The 14-year-old was charged as a juvenile and is expected to appear in family court next week. If Rosenbaum is convicted of the charges, he could be sentenced to four years in prison, Keary said.

IDG/P publishes *Suntech Journal*, *Portable Computing*, *Run*, *Amiga World*, *PC Games*, *A+/Incider* and *On!* in addition to *Gamepro*.

Extended DOS programs due at Comdex

BY PATRICIA KEEFE
CW STAFF

SANTA CLARA, Calif. — Comdex/Fall ’90 attendees this week will get first crack at viewing the initial batch of applications said to comply with the DOS Protected Mode Interface (DPMI) specification.

The demonstrations will include three DPMI servers and five applications. Released in May as Version 0.9, nearly 2,000 copies of the specification have been shipped.

Based primarily on a Microsoft Corp. specification, DPMI defines a standard way for extended DOS applications to cooperate in multitasking-mode DOS operating environments by using the protected-mode features of Intel Corp. 80286, 80386 and I486 chips. It replaces another extended DOS specification that is currently in use.

This means developers can sell a single shrink-wrapped package capable of running on multiple extended DOS environments. In turn, users will no longer have to upgrade their extended DOS applications as they change operating environments, thereby cutting costs.

According to Simon Wieczner, software business manager at Ergo Computing, DPMI will even allow “Unix, [Digital Equipment Corp.’s] VAX/VMS and mainframe applications to be migrated down to [DPMI] platforms without undue fuss or bother.”

Among the environments supporting DMPI are Microsoft’s Windows 3.0, Quarterdeck Office Systems’ Desqview, Unisys Corp.’s CTOS and VP/IX on Unix 386 and VM/386.

IBM on board

The DPMI Committee, which is composed of 12 applications and systems software developers, also announced last week that IBM has finally jumped on the bandwagon.

Other members include Microsoft, Lotus Development Corp., Intel, Borland International, Quarterdeck, Rational Systems, Inc., Phar Lap Software, Inc., Phoenix Technologies, Inc., Ergo and IGC Technology Corp.

The DPMI-compliant products to be demonstrated include Windows 3.0, Lotus’ 1-2-3 Release 3.1, Instant C from Rational, Phoenix Page for Windows from Phoenix, a DPMI test suite from Intel, a DOS server from Ergo and two as-yet-unannounced tool kits from Phar Lap.

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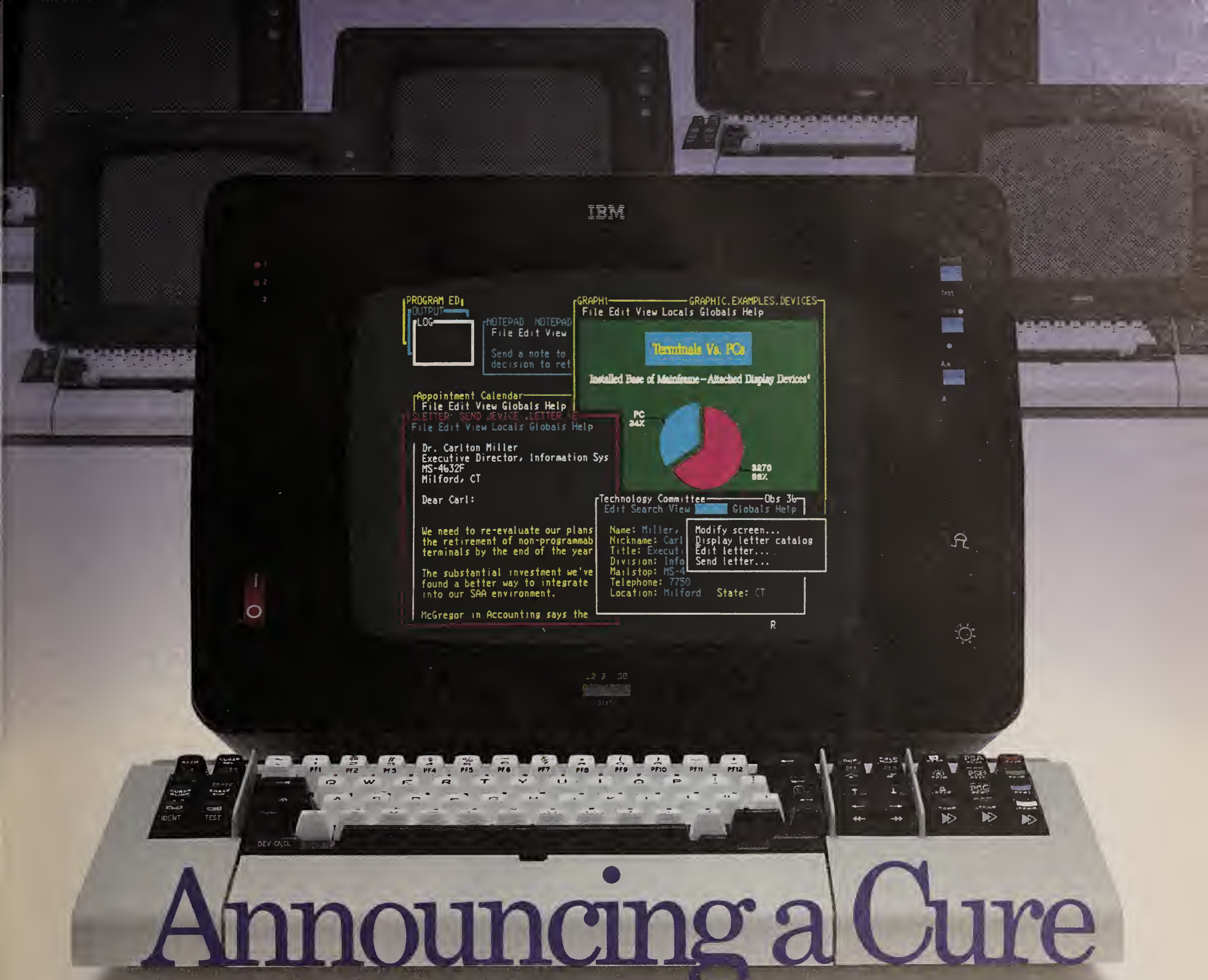

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ADVANCED TECHNOLOGY

TECH TALK

Hard Drivin'

■ Atari Games Corp., a top maker of arcade video game machines based in Milpitas, Calif., said last week it plans to adapt its best-selling Hard Drivin' game to nonentertainment applications. The game's sophisticated audiovisual effects will be used to develop specialized driving simulators for such applications as driver's education and to test the effects of substance abuse on driving skills. The low cost of the technology enables the company to build an advanced simulator for a fraction of the cost of other products with similar capabilities, Atari said.

Flat color

■ The state of Illinois awarded Zenith Electronics Corp. $1 million last week to develop new manufacturing processes for high-definition color displays. The award will help fund a 2-year effort to uncover new methods of applying phosphors to picture tube screens, Zenith said. The company said that the work is central to a multimillion-dollar effort to develop new production processes for large-screen versions of its patented flat-tension mask, high-resolution picture tubes.

That's Bat

■ The Bat is a two-piece keyboard — each piece has but seven keys — that will allow typists to greatly increase their typing speed, according to Infogrip and China Keyboard Ltd., the makers of the keyboard. Words, phrases, graphics and the like are entered using a combination of chords, much in the same way a pianist plays chords on a piano, said Ward Bond, president of Infogrip. A company name that would usually require 15 or more keystrokes could be entered with a single keystroke, for example. The keyboard, which plugs into a personal computer serial port, is not designed to replace standard computer keyboards, however. The Bat will be available in January, Infogrip said.

Biosensors computerize the canary

Researchers work to develop 'organic computers' that will mimic human senses

BY MICHAEL ALEXANDER
CW STAFF

In the old days, coal miners carried a canary into the mines to detect the presence of deadly, odorless methane. If the unfortunate bird suddenly keeled over, the miners hastily clambered up the shaft.

Today, researchers are looking for a canary of sorts in the field of bioelectronics, intent on developing "biosensors" that could be used to detect not only noxious fumes but everything from the odor of rotten fish to heroin.

Some researchers hope eventually to fabricate so-called biochips that could be the building blocks of "organic computers" several times smaller and faster than silicon computers.

Most research is being directed at developing biosensors containing organic molecules that react to minute changes in temperature, light or other environmental factors and convert those changes into electricity or some other form of energy.

Biosensors now under development or just entering the market include devices for monitoring and controlling glucose levels in a diabetic's blood, for detecting toxins and pollutants and for analyzing the freshness of foods.

Sniffing computer

Researchers at Arthur D. Little, Inc. in Cambridge, Mass., are working on a handheld "sniffer" that law enforcers could use to detect narcotics or explosives. "Our lab prototype can detect materials in less than five seconds," said Richard Taylor, senior consultant and manager of applied biotechnology at Arthur D. Little.

A biosensor has three parts: one layer containing a biological molecule, which functions as a receptor; a second layer containing an electronic or optical transducer to detect changes in the biological layer; and a third layer containing electronics for amplification, storage, memory and other functions.

The biomolecule receptor is often engineered in a laboratory, but researchers have used naturally occurring molecules from enzymes, insects and even exotic fish. One researcher at Washington State University is now testing a biosensor using the neurons from snails' brains.

One challenge that must be overcome: the stabilization of the receptor so that it remains active for several years.

Ultimately, work on bioelectronics technology could lead to the development of biochips and organic computers that could outperform silicon chip computers in several ways. Biochips can be packed more tightly and remain free of cross talk and heat generated by circuitry on silicon.

Tom Monahan

Environmental sensor

A biochip could also react selectively to environmental changes, thus allowing it to reflect not only on- and off-states but variations in between. In comparison, silicon computers only understand a binary language of zeroes and ones.

Researchers at the University of South Carolina in Columbia are working on developing organic molecules using synthetic materials that could be used to make what is often referred to as a biochip but could more accurately be described as a molecular electronic device, said James Tour, a synthetic organic chemist.

A practical molecular electronic device, still several years away, could be 1,000 times smaller and several orders of magnitude faster than conventional integrated circuitry, Tour said. "It has tremendous potential."

The challenge is to fabricate molecules that are large enough to be used in electronic circuitry, which cannot be made much smaller using today's semiconductor manufacturing techniques.

A molecular electronic device is made up of a conducting and a nonconducting polymeric chain joined to each other by a special silicon-containing bridge to form a switch. An electron jumps from the nonconductive chain to the conductive one, changing it from a conductor to nonconductor and back, Tour explained.

The Holy Grail of bioelectronics research is to someday create neuronal interfaces, or "artificial nerves," that could be implanted in humans to correct a variety of ailments. It is more fiction than fact thus far, Taylor said.

Devising matrix-based computer security

BY MICHAEL ALEXANDER
CW STAFF

Earl R. Collins Jr. at the California Institute of Technology in Pasadena says he is not "a computer person." But even so, he has designed what may be a foolproof security scheme for keeping hackers and eavesdroppers out of computer systems.

Collins, a mechanical engineer at the National Aeronautics and Space Administration's (NASA) Jet Propulsion Laboratories, has invented a computer security scheme based on a challenge and password system similar to the method in which a guard asks those approaching an outpost for a password. The challenges and passwords are alphanumeric codes contained in matrices of two or more dimensions.

"Nothing may be totally secure, but I have been told by computer security people that they figure it can't be beat," Collins said.

Jet Propulsion Laboratories recently received a patent for the computer-access code matrices system. Collins has more than 20 patents to his credit for tank tread design, fluid flow controls and other mechanical devices.

Multidimensional matrices

The way the scheme works is that a computer or terminal used to access a host computer and the host computer itself would have identical sets of codes. In a two-dimensional matrix, the host computer would issue a challenge consisting of two codes selected from the matrix. The codes, located in different rows and columns, define two corners of a rectangle, whose size is randomly selected.

The computer or terminal used to access the host must reply with codes taken from the opposite corners of the same rectangle. Assuming that the codes are correct, the host permits the remote user into the system.

The system discards codes that have been used in a successful access and does not allow the same set of codes to be used more than once. As a result, a hacker cannot get into the system by merely repeating the code sequence entered by a valid user.

A three-dimensional (or higher) matrix, with a wider variety of codes, could be used for systems that require higher degrees of security.

A caller who fails to reply with an accurate countersign within a preset number of attempts is automatically disconnected from the system. The next caller is automatically challenged with a new set of codes that are drawn from the matrix.

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EDITORIAL

Better bets

WE'VE WRITTEN, ON numerous occasions, about technologies and products that were unveiled with great fanfare, pregnant with every promise in the world: This will revolutionize the workplace; that will cut system costs in half; these will obsolete mainframes; those will yield that elusive competitive advantage.

Search back in your file of news articles and locate the bulging "videotex" folder. If you had a quarter for every magazine cover story written in the 1980s about the home computing explosion, you'd be able to actually buy a personal computer for the home, along with a disk for the recipes that will never be put on the system. There's a bunch of yellowing news clips on artificial intelligence. Here are some of more recent vintage testifying that OS/2 will outsell MS-DOS by 1991. Another bunch on debit cards.

They all sounded so good at one time. They failed for the same basic reason: Very few customers were interested in buying them. Some were promoted with half-truths, such as the myth of how easy home computers are to use. Generally speaking, they were technologies and products in search of a market.

Today, we have a technology that is being promoted heavily by some of the biggest computer companies in the business, as well as by systems integrators. What is unusual is that a rapidly growing cadre of customers are also singing the praises of image processing.

Is imaging destined to become a fixture in information systems? Or will we be including it in our editorial on four-flushers five years hence?

To try to answer that question, let's look at the facts — and the conjecture. Are there valid applications for the technology? Yes, absolutely. Our special report last week demonstrated this beyond a shadow of a doubt.

Is there a significant market out there? Are most businesses burdened with paper that travels painfully slow and inefficiently among parties that need it? Yes, again.

Is the technology cost-effective? In most cases where imaging implementations beyond the pilot stage exist, payback has been in the six- to 40-month range. Yes, again.

Are users flocking to the imaging concept? Our survey of 300 IS managers says no, but they are certainly migrating toward imaging in an orderly (read: nonfaddish) fashion.

Add to these considerations the fact that the costs of the enabling tools of imaging are plummeting, and you've got a compelling case for a promising technology.

If there is one potentially major obstacle, it is not the technology at all, but the management of it. Already the idea of "who owns it and who's responsible for it" has arisen between the user departments that ostensibly pay for imaging tools and central IS, which is called in on almost any intradepartmental implementation.

But this obstacle will be overwhelmed by the benefits of imaging, which is one of the surer technology bets to come along in some time.

News Item: Congress OKs provision to eliminate overtime pay for some programmers.
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CONGRESSIONAL BILLS FOR HIGH-TECH INDUSTRY
NONSALARIED PROGRAMMER

LETTERS TO THE EDITOR

Where are they?

I'm too far away from the American scene to comment on most aspects of your massive *Computerworld Premier 100* [CW, Oct. 8], but there are curious omissions.

Where was General Electric? I realize its enormous diversity makes it difficult to rate, but other diversified and decentralized outfits are included.

And above all, where was IBM? You say "firms that make the majority of their revenue from the sale of information systems and related products are not included in the ranking." Why not? And since communications, and information itself, are certainly "related products," why did you nevertheless rate MCI, GTE, AT&T, the Little Bells and Dun & Bradstreet?

I suggest next year you introduce information systems as an industry category, move the above companies into it and include at least IBM and DEC. And squeeze GE in somewhere!

Herb Grosch
Mies, Switzerland

Clear RISC

The future of reduced instruction set computing (RISC) is not blurred as your article titled "Lack of Unix unity blurs RISC future" [CW, Oct. 8] leads readers to believe. While the article focused on RISC-based Unix workstations, it did not adequately report on vendors that offer full lines of multiuser RISC-based systems.

Although not named, Hewlett-Packard is the one exception to offer commercial customers a choice of RISC-based platforms. Your Buyers' Scorecard [CW, Sept. 24] showed the HP 3000 Series 925 rated highest in "13 of 15 categories, outscoring IBM's AS/400 and DEC's VAX by a full five points" and second highest in the remaining two categories. RISC is the main differential.

The scorecard noted that HP "set the pace" in the area of price/performance. HP achieved those results because of the strength of our PA-RISC technology. Those benefits include offering customers mainframe-class performance at a minicomputer's price.

Rich Sevcik
General Manager
HP 3000 Division
Hewlett-Packard Co.

C++ = Hype

Regarding your recent C++ object-oriented language series of articles in the "Unix on the desktop" Product Spotlight [CW, Oct. 22], I have the uncomfortable feeling that someone is trying to get a bandwagon started and desperately trying to find people with titles who will say something exciting or maybe good but at least not bad. It is put forth as "vital improvements" that C++ provides function prototyping; doesn't ANSI C? It is also stated that "overloaded" function prototypes are allowed. I can have two functions with the same name, and the compiler will choose the "right" one. That doesn't give me a warm feeling. Call by reference is allowed. I can pass the argument "1"; the function can set the argument equal to "2"; and from then on 1 = 2. Whoopee! This is almost as much fun as Pascal.

One noteworthy statement is that C++ makes you pay attention to your data. Good programmers have always designed data first, especially those who grew up with machines where 64K bytes was a luxury and assembly language was the only game in town.

I don't know enough about C++ to either slam it or extol it, but it seems that it is being promoted as another language that will make bad programmers look competent. You guys aren't telling me anything I didn't know 30 years ago — i.e., good programs are designed by good programmers, and there aren't enough of us.

Jim Murray
Another Software Co.
Madeira Beach, Calif.

Irresponsible

In this age of environmental concerns, I consider AT&T's advertisement printed on "indestructible" paper [CW, Oct. 8] irresponsible and offensive. In very small print we are advised to remove the ad before recycling the magazine.

And do what with it? I have a suggestion: Mail it to AT&T with a message expressing your objections. Let AT&T dispose of them in their landfill, not ours.

Emily Johnston
Westminster, Md.

Computerworld *welcomes comments from its readers. Letters may be edited for brevity and clarity and should be addressed to Bill Laberis, Editor In Chief,* Computerworld, *P.O. Box 9171, 375 Cochituate Road, Framingham, Mass. 01701. Fax number: (508) 875-8931; MCI Mail:* COMPUTERWORLD. *Please include a phone number for verification.*

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Business must fill educational gap

If the U.S. is to remain globally competitive, industry needs to aid the educational process

JOHN AKERS

Most businessmen and women I talk to believe that our primary and secondary educational system today is foundering, whether measured by declining SAT scores, dropout rates or comparisons that show American children outperformed by children in Japan, Thailand, Hungary and Poland.

I recently visited two IBM operations — one in this country and one in Japan. I was reminded once again that IBM often does better in Japan than in the U.S. Same company, same management system, same processes, but yields, turnaround times, development cycle times and costs — are all frequently better in Japan.

Why? A good part of the answer is education.

We recently tested 700 manufacturing people at that U.S. plant and found that 67% measured below the sixth-grade level in reading comprehension. In Japan, we discussed the way newly hired graduate engineers — many with master's degrees — spend their early months working on the shop floor. The manufacturing people teach the engineers about the work being done. What a telling comparison!

Weakened education means a weakened work force, weakened international economic competitiveness, a weakened U.S. standard of living and a weakened democracy. Business is prepared to do whatever it can to help, to add to its already extensive record of assistance to education.

In IBM alone, for example, some 20,000 men and women have been participating in partnerships in more than 750 communities across the U.S. to improve education in grades kindergarten through 12. IBM itself last year contributed $20 million for primary and secondary education grants. But given the challenge we face, business must do even more.

The Business Roundtable — 200 chief executive officers of major U.S. companies — has launched an effort toward the educational goals set by President Bush and the governors of all 50 states.

Some of you may be thinking: We've heard this before. Business comes in with a lot of fanfare, undertakes some initiatives — often amateurish — and then runs out of gas.

Let me just say that we expect this time we'll do better. In the first place, our companies have signed onto a 10-year effort — personally by each chief executive, and with increased resources from each company.

Aiming for the heart

We have agreed to focus on state educational policy — the heart of the engine, where many of the policy decisions are made and most of the money comes from. And we are aimed at thoroughgoing reform — at the building of a transformed educational system, with nine components aimed at reaching each student:

1) Such a system should rest on some underlying assumptions: that *all* students in our culturally diverse society can learn both the basics and high-order skills; that we know how to teach *all* students successfully; that curricula must reflect high expectations; and that *every* child needs an advocate — someone who cares.

2) The system should be judged not by the processes it prescribes but by the results it produces.

3) In such a system, we need to do a better job of assessing students' ability to think and solve problems. We must set high standards for everyone in the educational process and devise effective measurements against those standards.

4) Schools should receive rewards for success and penalties for failure.

5) Each school's staff should have a strong voice in running that school — selecting its personnel, setting its curriculum and writing its budget. How else can we hold staffs accountable for schools' performances?

WEAKENED EDUCATION MEANS a weakened work force, weakened international economic competitiveness, a weakened U.S. standard of living and a weakened democracy.

6) In this new system, we must put more muscle into staff development, including teachers' mastery of subject content and teaching methods and a strong program for preservice and in-service training for both administrators and teachers.

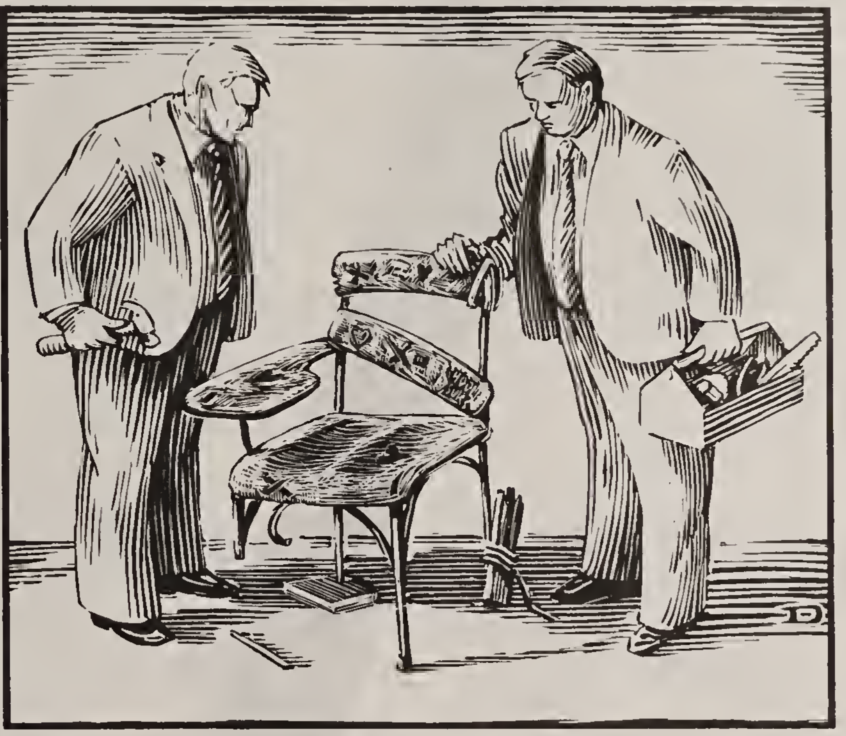
We should hire stars, free them from excessive regulations, reports and bureaucracy and let them teach.

7) We must do far better with prekindergarten programs to get children ready to learn. For openers, we need full funding for Head Start — a program that incontrovertibly has proven its efficiency and effectiveness.

8) We must reduce impediments to learning and do all we can to ensure that children do not come to school ill-nourished, sick and ground down by poverty.

9) We should make constructive use of technology to raise the educational productivity of both teachers and students.

A few weeks ago, I visited an inner-city primary school in New Haven, Conn., one of the most poverty-stricken and drug-devastated cities in the U.S. I met with teachers, administrators, students and parents.



Bob Dahm

I learned how, despite enormous difficulties, New Haven has sharply cut its dropout rate in the past seven years; how the school district pays to help needy students prepare for and take the SAT test and visit college campuses and how a strong and rising percentage of the district's graduates now go on to postsecondary education.

Leadership, from the superintendent, principal, teachers and parents, was obvious. The kids were all in uniform. Computer technology was in use. Every child goes through [IBM's] Writing-To-Read program.

It was an emotional morning for me, and I shared everyone's pride in what was being accomplished. If it can be done in New Haven, it can be done anywhere in America.

But can we stop here — stop with the transformation of our educational institutions alone? The answer is no.

Our shortfall in education is only a part of a much larger shortfall, a failure in the most basic responsibility any society can have: to honor the bedrock compact that runs from one generation to another.

Thomas Paine phrased it simply: "If there must be trouble, let it be in my day, that my child may have peace."

In recent years, what have we done with that commonsense idea? I think we've turned it upside down to read: "If there is to be affluence and good living, let it be in our day and let our children have the trouble."

We have cannibalized the compact, stolen from the future for the present, stolen from our descendants for ourselves.

We have lived it up with automobiles and TV sets and VCRs from Japan, Germany, Korea and other countries. We haven't paid for these by selling them American products of high quality and low cost, because we don't produce enough of them. Therefore, we have had to sell them things they *will* agree to accept — U.S. Treasury bonds at high rates of interest and land and buildings from Honolulu to Pebble Beach to Manhattan — the patrimony we might otherwise pass on to our children.

Look at the way we've raised our gross national product over the past 15 years. Did we do it primarily by saving as our competitors do, investing in new plants and equipment and increasing our productivity? No, we took another route to increase our GNP. We put more people into the labor force — millions of them, largely women formerly in the home. Women have made an incalculable contribution to our economy. But that contribution, coupled with the work-time absence of men from the home, exacts a price. Who has been paying that price? Our children. Our children and their education.

Education must begin in the home, with parents — mothers *and* fathers — getting children ready to enter kindergarten, reading to them, listening to them, answering their questions, making sure they do their homework, rationing TV, getting involved at school, working with their teachers and extending learning experiences.

I was shocked to read recently the results of a survey of schoolchildren conducted by Professor Robert Coles at Harvard, who asked how many would try to cheat on a test. Among elementary children, he found that 21% would. Sixty-five percent of high school students said they would.

What's going on? We cannot tolerate this moral erosion.

There are many obstacles: single parents with full-time jobs; families with two parents who both work — many *having* to work to make ends meet; illiterate adults, adults on drugs or adults who have simply abandoned their children. Because of these problems, business and government must do all they can: with day care centers, programs like Head Start and encouragement of employees to work with children and schools.

But this plain fact remains: If we as parents don't have the time, energy, ability or inclination to do these things, we as a nation have our priorities wildly wrong.

We can't go on like this. We can't go back to a bygone world of all-male wage earners. We have only one alternative that makes sense: We *must* find a way to organize our society to assure, simultaneously, vigorous economic productivity, abundant career opportunities for both men and women and plentiful child-nurturing time for parents.

The time has come for all of us — in government, education and business — to launch a sustained, intensive examination of this most significant national problem, to recommend specific steps our schools, work places and homes can take to accomplish those three ends and to follow through with action.

For this and all the challenges we face, what do we need?

Two things, I believe. First, realism — unflinching resolution to face facts, ask tough questions, major on the basics.

Second, discipline. Discipline that leads parents to put their children first; schools to commit themselves to turn out winners; corporations committed to eliminating shoddy work and achieving world class efficiency and quality; and discipline that leads federal, state and local politicians to look beyond today's comforts and next week's elections to the enduring good of this country.

Akers is chairman of IBM. This piece is excerpted from a speech he gave on Nov. 1 to the College Board National Forum in Boston.

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SYSTEMS & SOFTWARE

COMMENTARY

Sally Cusack

An absence of hand-holding

It was a Kodak moment. A fantasy come true. Or, if one prefers to view it from the opposite end of the spectrum, an unsettling event.

From his position behind the podium, the president of a major international software company slowly shook his head while making apologies to his audience for the product's shortcomings.

Hasso Plattner, co-founder and president of SAP AG, kicked off his opening remarks by assuring the 350 customers at the annual user conference that the next generation of the company's MRP II-based software would not be available for three years.

Having established that happy fact, he nonchalantly proceeded to tick off a laundry list of big and small problems that required immediate attention in the company's current offering.

Pausing periodically to think, Plattner methodically described each and every difficulty users could expect to encounter with the mainframe package, and in some cases, was even kind enough to provide overhead illustrations.

No lights, no lasers, no hype. No vague references to "areas of leadership" or promises of "continuing to support our customers' needs." Just lots of low-key information coupled with actual delivery dates and performance expectations.

It was the type of thing that

Continued on page 37

Shearson looks at S/390 option

BY ROSEMARY HAMILTON
CW STAFF

NEW YORK — Shearson Lehman Brothers, Inc. is on its way to the IBM System/390 platform, a plan that will both deliver new functions and reduce the pieces of hardware on the data center floor, according to Hank Hamilton, senior vice president of information systems.

The company installed an Enterprise System/9000 Model 720 in September. Tied into its ES/9000 strategy are plans to add the fiber-optic-based channel architecture, Escon, to test the system coupling capability, Sysplex, and to take a close look at the security processor, the Integrated Cryptographic Feature, for future implementation.

Hamilton said he expects to reduce his installation from six 3090s to four bigger ES/9000s by moving to the new high-end models.

"Our strategy is to have fewer hardware systems with the same number of images," he said. "The thrust is to collapse the logical images into fewer physical images."

Replacing 3090S

The ES/9000 Model 720 was brought in to replace a 3090S model. Hamilton said it has run without a hitch and offers the performance of a 3090 600J, which is the heart of a Model 720.

While the mainframe has the frame and environmentals of the new generation, it is based on a J-model engine.

"It has multiple power supplies," Hamilton said. "We took one hit, and it automatically switched over to a backup. We didn't lose a heartbeat."

Shearson expects to begin moving to the Escon architecture next year. Escon represents a major departure for the I/O process because it provides both a new physical medium and method for transmitting data to and from the processor. With Escon, which will be made available in phases of the next year, a user can set up devices more than five miles away from the CPU and get transfer rates of up to 10M bit/sec.

"We're starting to investigate it," he said. "We're trying to understand the software components and the facilities issues, like how to run the fiber cable under a raised floor."

At the same time, the company is "on the verge of experimenting" with the IBM Sysplex capabilities, Hamilton said. Sysplex is another IBM offering that will be delivered in phases. It will provide a coupling capability to link a complex of processors.

Looking at security

Finally, Shearson is evaluating the IBM security coprocessor device against its own internal security system. "We are working to understand the benefits [of IBM's product] against our own security system," he said.

The Shearson system, which is closely tied into IBM's RACF security software, does not contain an encryption/decryption facility.

"It's missing that," Hamilton said. "That's why we are looking to pick up [the IBM product]. We aren't the [U.S.] Department of Defense here, but we have a keen interest in this."

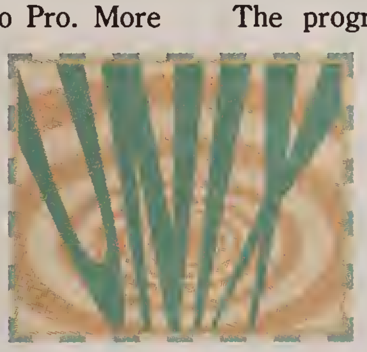
Vendors integrate Unix offerings, cite demand

BY JOHANNA AMBROSIO
CW STAFF

Users' demands for more Unix business software are being heeded. Not only is the number of Unix applications growing almost daily, but some vendors are also integrating the different packages into a coherent whole.

This trend was apparent at the Unix Expo trade show, held in New York earlier this month. At the show, a group of vendors announced a consortium to integrate Unix application packages, and Unisys Corp. touted its integrated software environment.

Taking a different tack to providing Unix software, start-up company Hunter Systems, Inc. based in Palo Alto, Calif., has ported several popular DOS applications to Unix, including Multimate Advantage II, Dataease and Quattro Pro. More are in the works, and Hunter is also licensing its porting tools to companies that want to convert home-grown DOS applications to Unix.



The vendor consortium, called the X.desktop Software Initiative, will allow users to start a package by simply pointing and clicking on an icon that represents the package. Ultimately, the consortium will provide a common set of functions that users can perform in all supported applications — again through the use of icons.

So far, some 16 vendors have joined the group, including Ashton-Tate Corp., Oracle Systems Corp., Lotus Development Corp. and Wordperfect Corp. The program's organizer and lead developer is IXI Ltd. based in Cambridge, England.

The program and function icons will be implemented within IXI's X.desktop interface, which vendors including IBM, NCR Corp. and The Santa Cruz Operation are shipping as part of their user interface environments.

Unisys is also selling its own framework for integrating different software packages. Called the Value Added Platform or VAP, it consists of 50 different software and networking components that Unisys guarantees will work together. Currently available for Unisys hardware only, the VAP may eventually be available for other Unix systems as well, a spokesman said.

Users can mix and match among the VAP's components, which include Unisys and third-party software such as the Oracle and Informix Corp. database management systems and programming tools from Ryan McFarland Corp. in Austin, Texas, and Micro Focus in Palo Alto, Calif. VAP pricing depends on which components are selected.

Also at the show were new and improved shrink-wrapped Unix applications, including the following:

- Version 4.0 of a family of manufacturing, accounting and distribution software from IBES Corp. in Richardson, Texas.
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NEC

UPI swaps antique systems for agility

BY MITCH BETTS
CW STAFF

WASHINGTON, D.C. — It is hard to turn around a troubled company quickly when its computer systems are about as nimble as concrete shoes.

That was the problem faced by United Press International (UPI), the perennial No. 2 news wire service, when it was taken over by New York-based Infotechnology, Inc. in 1988. UPI's data center in Dallas held two ancient systems: a Univac 9080 mainframe for its news wires and an RCA Corp. Spectra 70 for its stock tables.

Making any changes to those 1960s-era systems meant a month-long project writing in assembly code, so changes were not made very often. "That was a concrete system. It virtually could not change," said William J. White, president of the company's information systems unit, Infotech Data Resources, in Vienna, Va.

Furthermore, UPI had made custom changes to the Univac 9080's operating system, "which made it even more difficult to support," said Kevin Hipps, vice president of Infotech Data Resources. "In fact, the people who made those modifications 10 years ago are no longer around."

At a time when other companies were using IS for competitive advantage, UPI's computer system was a "competitive impediment," UPI spokesman Milt Capps said.

But that was before UPI switched, on Aug. 29, to its new data center in Vienna, Va., which houses a Digital Equipment Corp. Vaxcluster, including two VAX 6000 Model 310s and two VAX 8550s. System changes that once took months of programming can be accomplished in one day using system commands, Hipps said.

Breaks a logjam

"The new system gives us vastly more flexibility and speed in communicating with an increased number of news sources and breaks a longstanding communications logjam that hampered efforts to provide reports tailored to individual clients' needs," said Pieter VanBennekom, UPI's executive vice president for editorial operations, in a company statement.

UPI's new managers said they believe flexibility is just what the news service — which was losing about $2 million per month several years ago — needs to help it return to profitability. UPI lost $3.3 million in 1989.

The wire service's latest strategy is to make big cuts in general news areas and focus on specialized information reports about business, sports and regional news. That means culling the appropriate tidbits from a variety of news reports and directing them to specific customers.

For example, UPI news clients in the Pacific Northwest could ask to have all stories dealing with the fishing industry routed to them as part of their custom service, officials said. The new computer system will be able to flag those stories for UPI editors.

"We're going to help the editorial process by electronically sorting through the news stories. Before, they might have had to wait for a call or depend on someone knowing they even wanted this stuff," White said.

Perry W. Miles, senior vice president for operations at UPI, said the system will also make it

Continued on page 35

Wang Unix introductions show open systems loyalty

BY SALLY CUSACK
CW STAFF

LOWELL, Mass. — Strengthening its commitment to the personal computer market and open systems, Wang Laboratories, Inc. recently unveiled multiuser Unix-based systems.

The DX100 and DX200 are the company's first microcomputers preconfigured for the Unix community. They extend the vendor's Dynamix series of multiuser systems, which run The Santa Cruz Operation's SCO Unix V/386 Release 3.2.

"Wang users are certainly interested in the Unix platform," said Wes Strickland, systems consultant for the U.S. Society of Wang Users (USSWU), based in Chicago.

Strickland said that USSWU has sponsored several Unix-oriented seminars and workshops during the past year, and all have been "well-attended."

Neil Boissoneau, assistant director of distributed systems at Hartford Insurance Group in Hartford, Conn., noted: "We aren't really doing a lot of Unix at the micro end at present, but we certainly haven't ruled it out."

He added that the company is in the process of determining what workstation platform best meets its next-generation application developer needs. Hartford now has a mix of PCs from Wang, Digital Equipment Corp., IBM and Compaq Computer Corp., many of which operate in a local-area network environment.

Wang's DX100, priced at $8,995, is based on an Intel Corp. 80386, 33-MHz processor and supports as many as 16 active users. The DX200, ticketed at $10,995, is based on a 25-MHz Intel I486 processor. It can support as many as 32 users, the vendor said.

Both units include standard memory configurations of 4M bytes, expandable to 16M bytes, and offer cache memory and a 16-bit intelligent small computer systems interface-based controller.

They are slated for a December delivery.

In other announcements, WLT Systems, Inc., a wholly owned subsidiary of Wang, last week introduced a 33-MHz Intel 80386-based machine as the most recent addition to its PC Express product line.

The WLT AT333C-6 is targeted at computer-aided design and manufacturing, scientific databases and compute-intensive engineering applications.

The machine is priced from $2,640, which includes three years of free on-site warranty service, according to the company.

Prime Computer keeps the midrange faith

BY SALLY CUSACK
CW STAFF

NATICK, Mass. — "Never say die" is becoming the war cry of the proprietary midrange industry, where Prime Computer, Inc. recently added two entry-level computers to its 50 series family of products.

The 5310 and 5330 systems are self-contained, desk-side units based on CMOS architecture, and both run the Primos operating system. The units replace the company's 2850 and 2950 boxes and are designed to function as stand-alone units or as nodes on a network.

The announcement was seen as a sign of Prime's resolve, and users backed the vendor's efforts to support the proprietary installed base. However, those users appeared to be in no hurry to sign up for the new systems offerings.

"Companies are giving their proprietary bases headroom by expanding their product lines," says Robert Kidd, an industry analyst at Dataquest, Inc., a market research firm based in San Jose, Calif.

Citing Data General Corp.'s recent MV computer addition and Digital Equipment Corp.'s recent VAX 6000 Model 500 system announcement, Kidd noted that vendors with sizable proprietary bases are dead set on keeping them.

No immediate upgrade

Colonial Freight Systems in Knoxville, Tenn., currently depends on a Prime 2950 for load entry, accounts payable, accounts receivable and payroll applications. According to programmer Gary Bebout, the company is not looking to upgrade the system immediately but will be considering the possibility in the next year or two. Colonial Freight moved to the Prime platform in 1987 when replacing an older IBM System/3.

Another Prime user, an employee at Pioneer Valley Transit in Springfield, Mass., said the company recently upgraded from the Prime 2250 to the 2850 box — a move that doubled computing performance. She added that another system purchase is "not something we would consider at this point in time."

The 5310 supports up to 64 users and can be configured with 8M to 64M bytes of memory. Pricing ranges from $36,858 to $65,305. The 5330 supports as many as 128 directly connected users and offers memory configurations from 24M to 128M bytes. It is priced from $85,247 to $100,492.

Both systems are said to support more than 2,500 software applications, as well as Prime's Information commercial database management system and Oracle Systems Corp.'s Oracle database management software. The systems are available now.

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Sales of Delta 3000 grow

BY MAURA J. HARRINGTON
CW STAFF

CUPERTINO, Calif. — Motorola, Inc. has been hit hard with criticism from analysts lately for its delay in volume shipments of its 68040 microprocessor. Yet it has had an upswing in sales of its 68030-based Delta Series 3000 product line in the past month, thanks to a recent onslaught of sales to large user sites.

Among those signing multimillion-dollar contracts for Motorola's Delta Series 3000 multiuser Unix-based systems are Service Merchandise Co., a catalog showroom retailer, the New York City Department of Human Resources Administration (HRA) and the state of Tennessee. United Airlines is also expected to close a contract with Motorola to purchase the Delta Series 3000 systems today, a Motorola spokeswoman said.

The Delta Series 3000 systems have been around for about two years, and the company started shipping a 50-MHz version of some of its Delta products in November 1989, the spokeswoman said. Both the Model 3840 and 3640 have the capability to run at 50 MHz, she added.

Service Merchandise has a five-year contract to purchase 500 Delta Series 3000 systems, with the first 100 of those to be shipped by the end of third-quarter 1991, the company said. The Delta Series 3000 systems will serve as back-office systems in 350 locations, hooked up to a local-area network, to support point-of-sale terminals for the company's inventory control, merchandise selection and order processing, the company said.

The state of Tennessee has agreed to purchase up to $55 million in Delta Series 3000 Model 3840 high-end systems and 3640 midrange systems during a 12-month period, according to Motorola.

Also, the city of New York's HRA will accept delivery of 51 Delta Series Model 3640 systems, which are the basis of a $4.5 million contract.

Migration aid for DEC users

BY MARYFRAN JOHNSON
CW STAFF

The president of Smartstar Corp. found himself thinking of Andy Warhol's prediction about fame last week, as this small software tools vendor enjoyed its own 15 minutes of acclaim during Digital Equipment Corp.'s database announcements.

"This was like a coming-out party for us," said John Markel, president of the Goleta, Calif.-based company that will supply new database migration services from Oracle Systems Corp.'s RDBMS and DEC RMS to DEC's premier relational database, RDB.

This week, Smartstar will announce its own migration tools, which allow users to move data and applications in either direction between the Oracle and DEC databases. The DEC products can convert data in only one direction: from Oracle or RMS to RDB.

Independent application

The Smartstar products convert data, data definitions and complete applications, which are then portable among SQL-based relational databases.

Their particular claim to fame is a low-maintenance "database-independent" application development technology, which reduces coding requirements and allows software designers to postpone (until the physical design phase) the choice of which relational database will run the application.

The privately held company recently secured venture capital funding from Boston-based Advent International, Inc. and has launched a consulting service as well.

"In the past, we were in the mode of the total products company, and we bowed out of service," said John Shackleton, vice president of Smartstar Consulting Services in Oak Brook, Ill. "But as the technology gets more complex, there's no way to drop your product on somebody and expect them to be able to use it without some help."

Burst of growth

Shackleton, who left a consulting position at Oracle two months ago, said every dollar of revenue at Oracle is matched by at least $4 in professional services. The consulting business there grew from nothing to $125 million in four years, he added.

Staffed now with 16 consultants and claiming expertise in building worldwide corporate relational database systems, Smartstar has signed on Du Pont Co. as one of its first clients. DEC has also referred another 18 potential clients, Shackleton said.

Smartstar is a longtime marketing partner privy to DEC's planning and development. About half of the DEC shops with fourth-generation language (4GL) tools are using the Smartstar products, according to market researchers at Computer Intelligence in La Jolla, Calif.

As a software vendor inexorably tied to DEC's multivendor networking strategy, Smartstar officials said they plan to follow DEC's lead and move Smartstar products onto DEC's Unix-based platform and later to other Unix-based systems.

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By Gina Smith
See DRI Page 6
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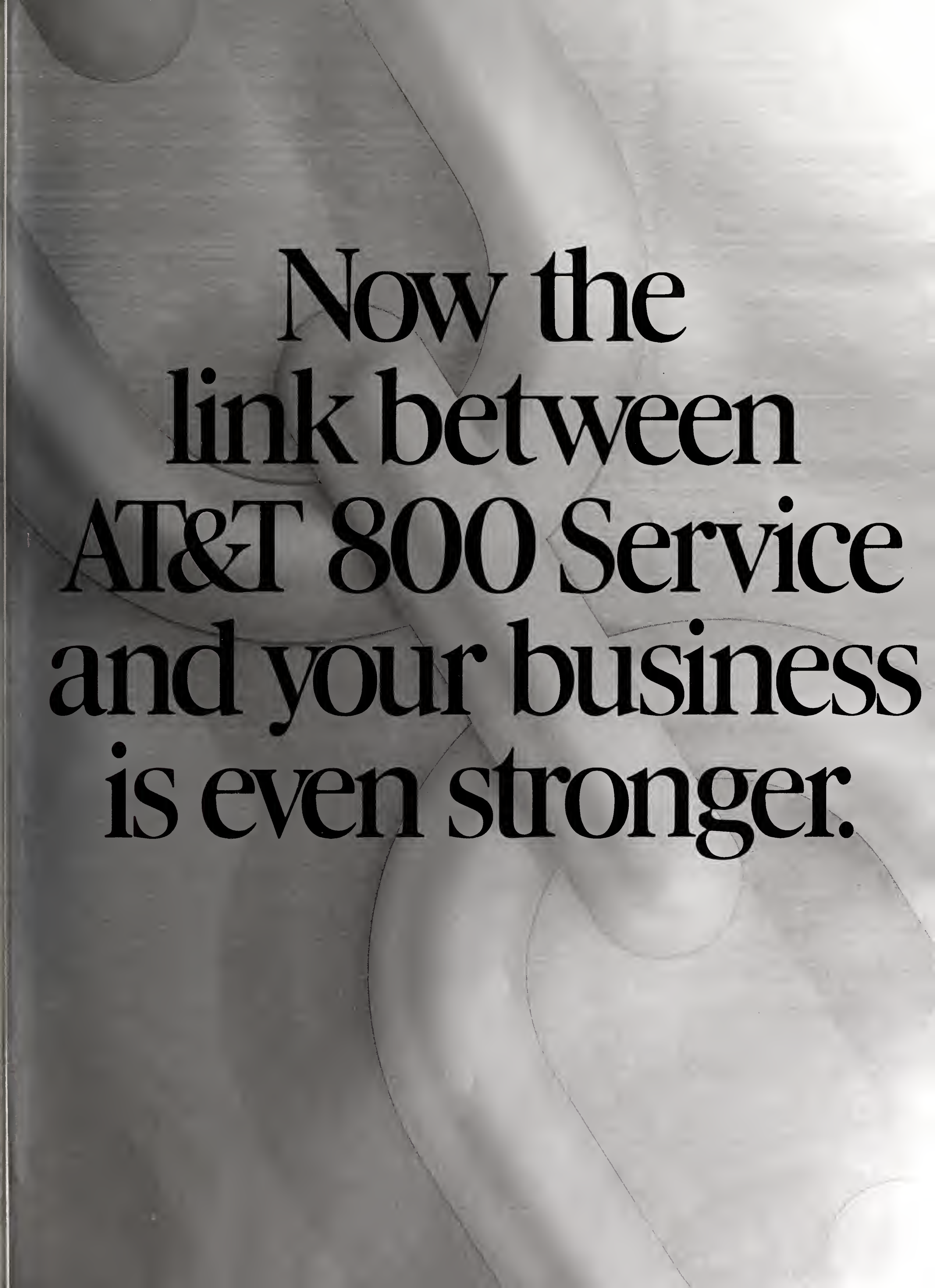
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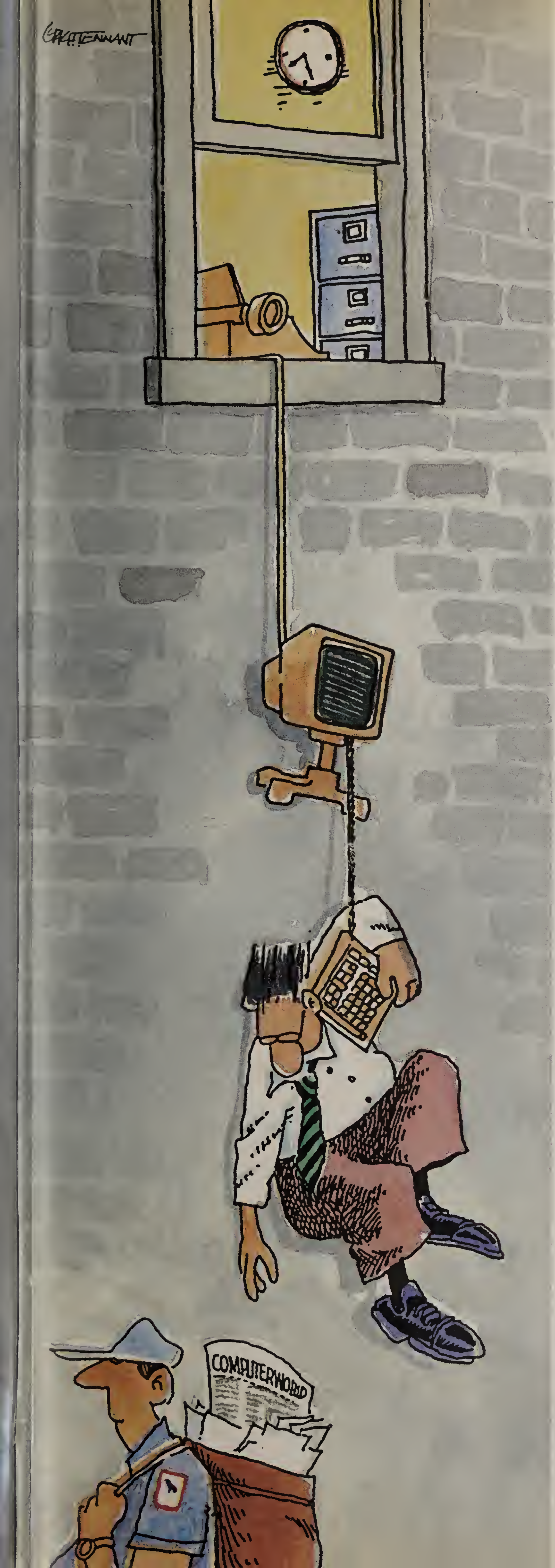

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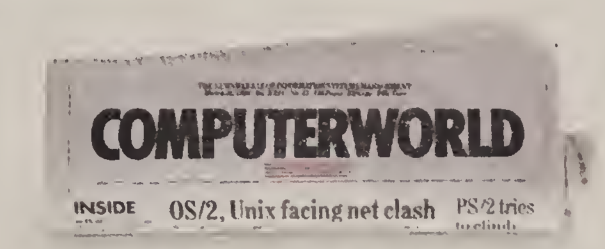

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Software firms collaborate, develop CAE framework

BY JOHANNA AMBROSIO
CW STAFF

NEW YORK — Ten software companies banded together recently to develop an integrated environment for computer-aided engineering (CAE).

Taking the lead on the project is Interact Corp., a New York-based vendor of a framework product called The Integrator. The company will be encapsulating software products from nine other software vendors into that framework. Users will then be able to select any of the encapsulated tools from the framework.

"It's analogous to an interface," said Matt Goldstein, Interact product marketing manager. "Once a tool is encapsulated, a user can immediately plug in that tool and use it." Interact's encapsulation program will be completed by the end of the calendar year.

Other companies participating in the program include Zycad Corp. in Mt. Olive, N.J.; Interleaf, Inc. in Cambridge, Mass.; Beaverton, Ore.-based Test Systems Strategies, Inc.; and Meta-Software, Inc. in Campbell, Calif. The tools involved run the gamut from electronic publishing to schematic capture, code generators and design analysis.

However, Goldstein said, the encapsulation process does not guarantee that the tools will work with each other, only that they work with the framework. Although The Integrator will help to standardize the output from each of the tools, it will not automatically ensure that the output from one tool flows into another. The tools will be integrated with each other only if the vendors have done that integration work prior to the tools being encapsulated into the framework.

The encapsulation program will help automate some of the tasks that users have had to perform themselves up until now, Goldstein said. For example, a user of software development tools can simply edit the source code; the compile and link steps are done "under the hood," he said.

Interact is rushing to beat other companies, including Mentor Graphics Corp. in Beaverton, Ore., which are undertaking similar projects. However, Goldstein said, "unlike the other framework vendors, we sell no software tools or hardware platforms, so we have no biases toward anything."

Arm's-length relationship

Even though IBM holds a 40% stake in Interact, Goldstein said, it has been a "fairly arm's-length" relationship, and Interact is "free to determine our own technology strategies." The Integrator framework runs on Sun Microsystems, Inc. workstations; a port to the IBM RISC System/6000 is expected by the end of the year.

Also, he said, it is easy for users to encapsulate their own homegrown tools or tools that are not yet part of the formal project.

Still, the encapsulation project might be a little too late for users who have already invested in large CAE programs. "We're already working with systems integrators and software vendors to help integrate all the tools we have," said the information systems director of a Midwest manufacturing company who did not wish to be identified. "So we're just not interested in any other kind of program."

INTERACT WILL be encapsulating software products from nine other software vendors.

UPI

CONTINUED FROM PAGE 29

easier for UPI to take news feeds from various state news services and newsletters, an important development because UPI's turnaround strategy is big on alliances with other news media.

One of the biggest technical challenges was moving the stock listings off the RCA Spectra 70, because over the years, UPI clients had come to depend on the exact format of the stocks feed. In fact, they had built pattern-recognition programs allowing them to automatically reformat the tables for their own pages.

Consequently, Infotech had to undertake a complete reverse-engineering process to duplicate the Spectra 70's stocks output — right down to the column spacing — and conduct extensive testing with customers, Hipps said.

On the news side, Infotech had to make sure that UPI's editors did not lose any of their beloved editing commands. Now that all of the old functions have been duplicated, "we can do some things that will knock their socks off in terms of on-screen Help . . . that can improve the journalists' productivity," Miles said.

"This [transition] has been work," White added. "Now, we can really start doing the fun things for our editors and customers."

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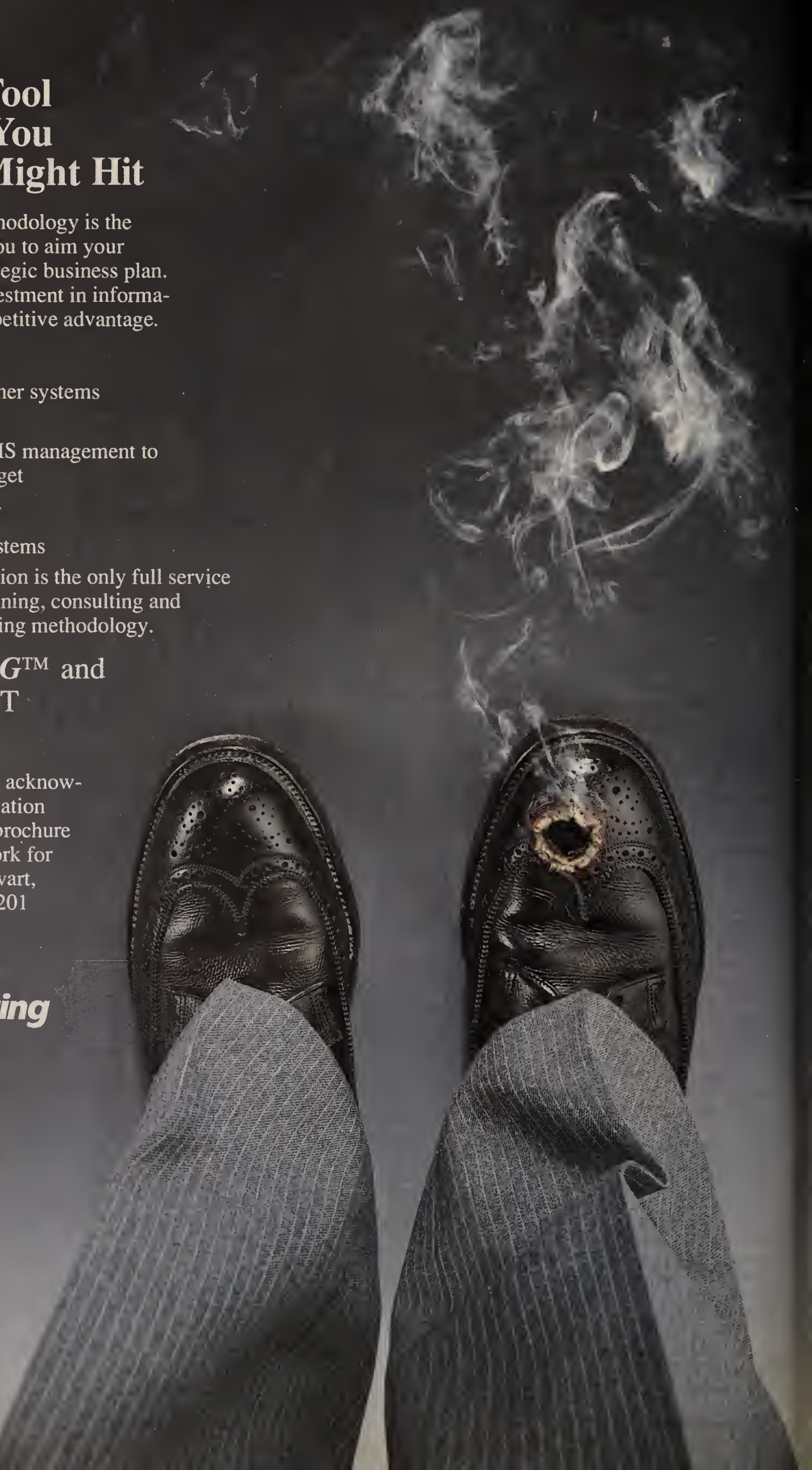

Cusack

CONTINUED FROM PAGE 27

would give typical company marketing managers nightmares or ulcers.

A product marketing director at a competing corporation, established both here and abroad, scoffed at the German company's methods. "It's just another form of attention-getting reverse marketing," she said. "They're just saying 'look at us — we're the humble, honest company.' That's crap. "

Could be. If so, is this a wise strategy for a corporation trying to establish a strong presence here in the U.S., where the average consumer has grown accustomed to daily forced feedings of direct and indirect advertising, media glitz and hyperbole?

U.S. companies are spending billions of dollars each year on advertising campaigns, and in the increasingly competitive computer industry, many millions are spent on suave marketing and public relations personnel — whose sole purpose in life is to supply customers with soothing words and reassuring promises while writing carefully crafted, noncontroversial speeches for chief executive officers.

Obviously, a company like SAP, boasting clients such as Mobil Oil, Dow Chemical, and Du Pont, can afford to imitate its competitors in that respect, but what happened at this year's user meeting?

"Oh, they're always like this," commented an analyst who has been following the company's progress for several years . "It's a bit unnerving, isn't it?"

Plattner's speech that morning was peppered with statements guaranteed to freeze any warm fuzzies the users might be feeling about the product.

Among them were announcements that the next-generation product will have "weaker performance" than the current offering, reportedly a trade-off to accommodate the world of open systems. He also made a flat-out declaration that the customer user interface would definitely *not* follow the American tradition of icon-based menus; it would be character based. Period.

Actually, the users didn't seem surprised. It was as if they expected to be presented with the sort of perverse exercise in logical deduction that was played out before them: State the problem; illustrate the problem; define the solution; target a resolution date.

An SAP representative defended his company's approach: "One has to understand the mind-set here," he said. "These executives are also engineers, and they truly believe that their technology is superior and have no qualms about addressing any defects — real or potential — as they are confident they will resolve them."

That was perhaps the only recognizable marketing statement forthcoming that morning.

Cusack is a *Computerworld* staff writer.

NEW DEALS

Ralston group signs DEC pact

Protein Technologies International, a wholly owned subsidiary of St. Louis-based Ralston Purina Co., has signed an agreement with **Digital Equipment Corp.** on a $1.9 million project to integrate Protein's manufacturing facilities with Ralston headquarters on a Vaxcluster with local- and wide-area networks.

Stratus Computer, Inc. last month announced a $3.5 million contract with **Sistemas Technicos de Lotterias del Estado S.A.** in Madrid to provide five Stratus XA2000 fault-tolerant systems for a fully automated nationwide lottery system. The Spanish national lottery is one of the largest in the world, with annual revenue of more than $6 billion. The Stratus boxes will act as communications processors for the newly automated lottery system, which is expected to be fully on-line in 1992.

Bull UK, a subsidiary of Groupe Bull, has scored two major contract wins during the past several months — a $12.6 million contract with the UK's **Royal Air Force** (RAF), and a $2.28 million agreement with the **Leicestershire Health Authority.** Bull UK will be supplying 42 DPS 6000 midrange computers and 1,700 terminals and printers to automate administrative functions at 42 RAF stations during the next two years. A Bull customer since the early 1980s, the RAF is reportedly banking on the Unix coprocessor found in the DPS 6000 systems to facilitate a gradual move to open systems. The Leicestershire order will involve the installation of three Bull DPX/2 340 and 13 DPX/2 210 Unix-based systems. Additionally, 13 DPX/2 210 systems for associated clinical information systems will be installed to assist doctors in routine administrative and clerical functions. The order also calls for more than 100 Zenith 386 SX PX terminals. Zenith Data Systems is a subsidiary of Groupe Bull.

EIS II

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It's estimated that more than half of today's Executive Information Systems fail.* So if you're thinking about installing a traditional EIS, think twice.

EIS II is the new generation of Executive Information Systems. It's more than just an electronic "slide show". It's true analysis and issue management. For executives, their staffs, and managers throughout your organization.

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- Intelligent exception reporting and drill-down
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For a free EIS II Information Kit, call **617-890-8717** (**416-221-2100** in Canada).

information resources inc

**David W. DeLong, co-author of "Executive Support Systems: The Emergence of Top Management Computer Use."*

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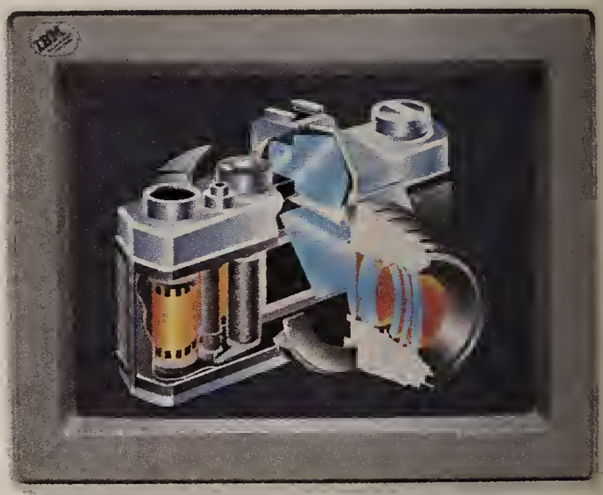
IBM lets the
Now 486 technology

Without the proper venue, dazzling ability often falls short of expectations. That's certainly been the case with the Intel 486™ microprocessor, a processor that hasn't been utilized to its full potential. So that's what IBM set out to do. Just as it takes a seasoned jockey to turn a thoroughbred into a champion, it took IBM to give the 486 processor every opportunity to work its genius. Introducing IBM Personal System/2® Model 90 XP 486 and Model 95 XP 486.

From speed and storage capacity to graphics capabilities and upgradability, the new PS/2® Models 90 and 95 are designed to optimize the power of the Intel 486 processor and deliver a truly balanced performance—equipping you with solutions for today, and providing a platform of growth for tomorrow.

THE 90'S ARE A POWERFUL BREED.

Right out of the starting gate, the Models 90 and 95 will astound you with their power and sophistication. Featuring a 33 MHz processor and a 25 MHz processor that's easily upgraded to 33 MHz, they deliver blazing speed and balanced performance, expanding your capacity for computer-intensive applications like CAD/CAM, financial modeling and multimedia. The course between your data and your processing has also been strengthened—the Micro Channel™ 32-bit data path, combined with a lightning-quick data-transfer rate, not only optimizes the present power of the 486 processor by feeding it a steady stream of information, but also provides for processor enhancements and will allow you to benefit from advanced operating systems to come. Plus these other innovations: a wider 64-bit data path which optimizes the 486 processor's access to system memory; 4MB memory standard (expandable to 32MB); and a 256KB cache option for even greater speed. All in all, it's easy to see how the concept of computer "power" has been enhanced, and how IBM helps you take full advantage of every second of computing time.



BRILLIANCE ON DISPLAY.

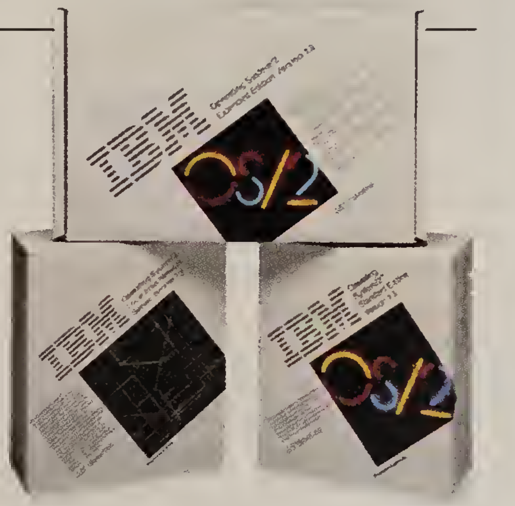
With increased power comes increased capabilities—the most visually stunning of which is Extended Graphics Array (XGA), standard on the PS/2 Models 90 and 95, and the heart of IBM's spectacular new display presentation.

With high resolution (1,024 x 768 pels) and execution that's significantly faster than VGA, XGA's sharper, clearer picture, coupled with the IBM 8515 color display, gives you swifter performance in windowed environments, and provides graphics-intensive applications such as desktop

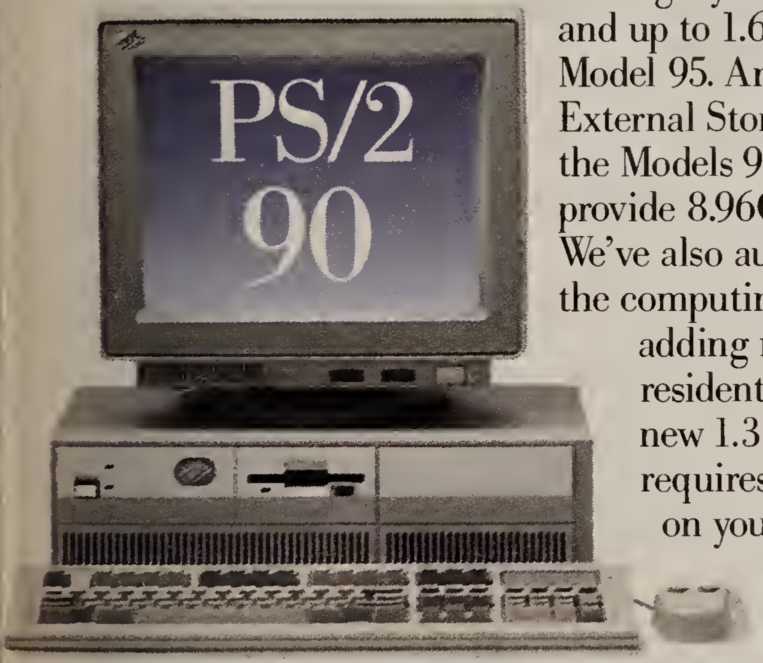
horses run.
realizes its full potential.

publishing, image processing and engineering design with a stunning new look.

FAST TIMES ARE IN STORE.



To satisfy even the most demanding storage needs, from LAN systems to data base management to numeric-intensive applications like financial analysis and modeling, IBM has one of the most advanced solutions available. IBM's super-fast SCSI hard disks are pure state-of-the-art performers. With additional hardfile expansion bays, the PS/2 Models 90 and 95 have enormous storage potential—up to .96 Gigabytes on the Model 90 and up to 1.6GB on the Model 95. And with the PS/2 External Storage Enclosures, the Models 90 and 95 can provide 8.96GB and more. We've also augmented the computing power by adding more flexibility to resident memory—our new 1.3 version of OS/2® requires as little as 2MB on your system. With this streamlined version you not only get more room for applications, but some users will experience a substantial performance increase in system functions as well. So when you need to make great strides with your computing power, you can count on IBM to give you terrific storage capability wherever you may need it.

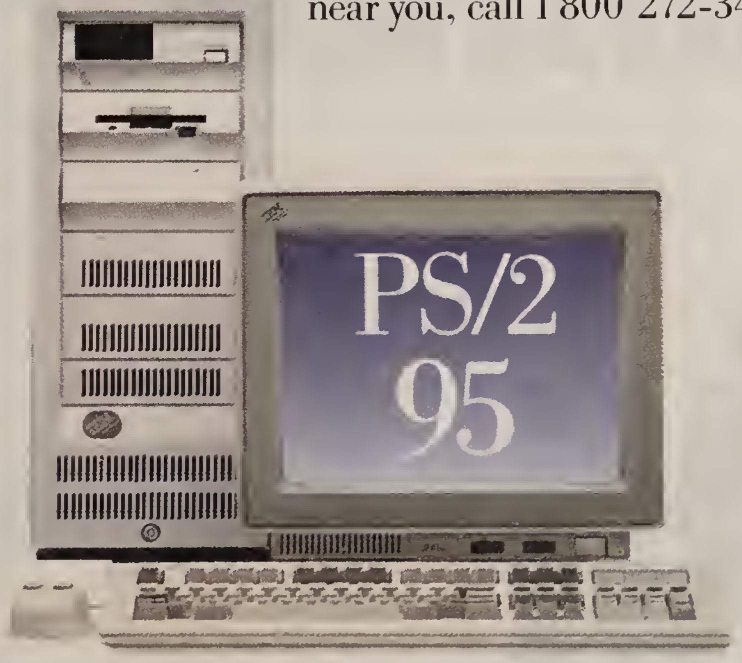


Features	IBM PS/2 Model 90	IBM PS/2 Model 95
Microprocessor		
Standard	80486	80486
Clock speed	25-33 MHZ	25-33 MHZ
Optional upgrade	33 MHZ	33 MHZ
Memory		
Standard	4MB (70ns)	4MB (70ns)
Maximum	32MB	32MB
Integrated Functions	Extended Graphics Array (XGA) and display port, dual DMA serial ports, DMA parallel port, pointing device port, keyboard port, diskette controller support for three drives, SCSI adapter with Cache.	
Fixed Disk Storage		
Standard	80-320MB	160MB-320MB
Display Modes		
APA Modes	XGA (includes all VGA modes) 640 x 480 x 256 colors/ 64 gray shades; 1024 x 768 x 16 colors/gray shades; hardware support for 132 column text mode; 16-bit direct color mode at 640 x 480 x 64K colors	
Available Expansion Slots	three 32-bit	six 32-bit
Bus Architecture		
Data path	MCA 32-bit	MCA 32-bit

DESIGNED TO KEEP YOU OUT IN FRONT.

For the turns and hurdles ahead, you'll need technology that has foresight built in. Through a unique design, the Expandable Processor (XP) allows for an architected family of upgradable processor enhancements that can extend the life of your system. With Micro Channel busmaster adapters, you can incorporate multiple processors—like adding "computers" to your computer. And coupled with the industry-standard Small Computer System Interface (SCSI), you'll be able to support new applications and continue to build on your system as your needs become more varied and complex.

With optimized performance in balance, power, speed and adaptability, the new PS/2 Models 90 and 95 are designed to keep you ahead of the pack. To find out more about the new leader in 486 computing, contact your IBM Authorized Remarketer or IBM marketing representative. For a remarketer near you, call 1 800 272-3438.



How're you going to do it?
PS/2 it!

IBM

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NEW PRODUCTS — SOFTWARE

Software applications packages

Software Creations, Inc. has announced a retail management software package that can be installed in a single cash register.

The Electric Merchant 2000XL can be used for register management, inventory control, order processing operations and a broad array of business review options. It is targeted at small gift and card shops, museums and food and liquor stores.

The product runs on IBM Personal Computer XTs, ATs or compatibles. It is priced at $295.

Two midrange versions are also available for use on Novell, Inc. Netware- or DOS-based networks: Electric Merchant 2000XL-Plus, which costs $595, and Electric Merchant 2000XL-Plus w/Net, which costs $895.

Software Creations
10035 Adamo Drive
Tampa, Fla. 33619
(800) 767-3279

Westland Software House, Inc. has announced Version 12 of its Medical Management System, which features pop-up windows, dynamic reporting and integration with Hewlett-Packard Co.'s Laserjet printers.

The system is based on AT&T's Unix System V combined with Informix Corp.'s database management system. It runs on HP 9000 Series 800 computers under HP-UX and HP Vectra personal computers.

Software costs between $7,500 and $40,000. Complete hardware and software systems range from $25,000 to $250,000. Pricing is based on configuration.

Westland Software House
23901 Calabasas Road
Calabasas, Calif. 91302
(818) 992-0081

Scientific Software, Inc. has announced the Alert CAD fault-tolerant computer-aided dispatch system and the Interswitch front-end fault-tolerant message-processing switch.

Alert CAD runs on Stratus Computer, Inc. or IBM fault-tolerant hardware and features a multithreading architecture and event-driven no-wait coding.

Interswitch was designed to enable users of computer-aided dispatch systems to pass messages among compatible or incompatible devices.

Both products require a Stratus XA2000 with a VOS operating system. License fees for Alert CAD and Interswitch begin at $250,000 and $175,000, respectively.

Scientific Software
600 Embassy Row
Atlanta, Ga. 30328
(404) 551-2546

Utilities

Macro 4, Inc. has announced that its Synchro CICS resource manager software package is available for users of IBM's VSE mainframes.

Synchro allows resources to be automatically switched from CICS and batch regions. In addition, CICS systems do not have to be terminated to run batch applications. CICS resources can reportedly be controlled by other CICS systems within a network via the LU6.2 protocol.

Leasing rates for Synchro range from $235 to $610 per month, depending on CPU size.

Macro 4
P.O. Box 187
Brookside Plaza
Mount Freedom, N.J.
07970
(800) 223-0414

Schumann Software, Inc. has announced a product designed to create IMS image copies.

Quick Image Copy uses execute channel program level processing and supports Full Function and Fast Path databases. It is integrated with Schumann's DBC for DL/1, a tool set designed to automate DL/1 database management.

A universal CPU license is priced at $8,000.

Schumann Software
433 Hackensack Ave.
Hackensack, N.J. 07601
(201) 488-8688

Continued on page 42

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Capturing document images—and managing their information electronically—can bring efficiency and economy to your archival or time-sensitive document records.

Whatever the size of your organization, Kodak Imagelink equipment and software can simply, cost-effectively capture a paper image on microfilm and/or optical and/or magnetic media. Then you can interact with that image in much the same way you do with data. A few keystrokes and the document you need appears on screen, complete with marginal notes, endorsements, diagrams and signatures. In a totally integrated information environment, an image can then be printed, faxed, distributed over a network, or even used for response by phone.

We have more than 60 years of business imaging experience to share. Ask your KODAK Business Imaging Systems representative how image management can benefit your information management. ***Call 1 800 445-6325, Ext. 330.***

CAPTURE THE IMAGE. CALL KODAK

The new vision of Kodak

IBM knows you won't get far with just a good looking front-end.

There are several cute front-ending software products on the market. They initially excite you and give a false sense of security. But, in the complicated world of corporate applications, building just a cute front-end is NOT Cooperative Processing, and certainly NO substitute for good design.

That's why IBM chose Multi Soft!

Amongst all their Business Partners only Multi Soft has the depth of experience in Front-end Development, Human Factors, Communications, Software Distribution, & Cooperative Processing necessary to solve the myriad of problems facing corporate America's migration to IBM's Enterprise Systems.

Is it only "what's up front that counts?"

IBM doesn't think so. Do You?

At first glance, some products look great. But it takes more than a slick interface and a mouse to build cooperative processing applications. It also takes mainframe & communications knowledge and an extensive background in human factors and ergonomics. And, you need tools which embody that human factors expertise.

Tools like the INFRONT products from Multi Soft. Tools that are easy to learn and easy to use. Tools that leverage your programming resources so that you can build cooperative processing applications quickly.

Tools that support the development of applications that are portable. Build your program once and then run it under DOS, Windows, or OS/2 without making any changes to your code. Build your program once and run it over asynch, LU2, and LU6.2 links - again, without changes.

The successful implementation of cooperative processing requires in-depth knowledge and the experience gained from developing systems for six years. Multi Soft gives you that and more.

IBM knows it - they selected Multi Soft as one of the few IBM Business Partners to participate in the System 390 introduction.

IBM even produced a video tape and a 'demo' diskette to show how the Multi Soft products complement the new IBM Enterprise Systems.

Call today and let us show you why IBM chose Multi Soft. We will send you a free IBM-Produced Video Tape & Demo Diskettes. Then, let's talk. You'll be amazed at the difference that experience and expertise can make.

Multi Soft's Products

EasySAA™ is an advanced Object Oriented CASE tool for rapidly creating SAA/CUA-compatible interfaces in minutes and integrates them into existing mainframe applications.

INFRONT/DS® (Development System) is a PC-resident developer's toolkit which includes a 4GL designed for cooperative processing, communications, and local file & database access.

INFRONT/HPO® (Host Processing Option) provides peer-to-peer communications between a PC and a host. It handles the low level communications tasks, allowing the developer to concentrate on the functional requirements of the application.

INFRONT/SDF® (Software Distribution Facility) automates the distribution and maintenance of PC software and files. INFRONT/SDF ensures that PC users always have the correct version of their PC applications and editing tables.

INFRONT/DB2 lets application developers use INFRONT to code SQL statements that execute against DB2 on the mainframe, or to create an ad-hoc query and download data to a PC in a completely menu-driven manner. Complete application development accessing DB2 data can be implemented purely from the PC.

OpenAPI provides a high-level API verb set and INFRONT communications modules so that the developer can create cooperative processing applications without having to learn low-level API's like HLLAPI or APPC. OpenAPI supports applications written in almost any language, such as C, COBOL,and dBASE.

Over 25,000 users Worldwide

The Experts in Cooperative Processing:

Multi Soft, Inc.

123 Franklin Corner Rd.
Lawrenceville, NJ 08648
800-888-4973
609-896-4100
Fax # 609-895-0072

Banner Software, Inc. has announced a source-code security system for Rexx, a procedures language for IBM's Systems Application Architecture.

Rex/Guard secures Rexx Exec commands so that data cannot be viewed and ensures that only one copy of an Exec is used.

According to the vendor, it can be used on any Rexx Exec and is available for systems operating under VM/CMS.

Pricing begins at $2,995.

Banner Software
9719 Lincoln Village Drive
Sacramento, Calif. 95827
(916) 364-0900

BMC Software, Inc. has announced an IMS database product designed to recover DL/1 databases.

Recovery Plus reportedly needs to make only one pass of change accumulation and recovery log data sets while recovering multiple databases concurrently.

Perpetual license prices begin at $17,500.

BMC Software
P. O. Box 2002
Sugar Land, Texas 77487
(800) 841-2031

Cybra Corp. has announced a software package designed to interface IBM midrange systems with Monarch Marking's Monarch 9400 series of thermal transfer printers.

Markmagic enables users of IBM System/36s, System/38s or Application System/400s to create label formats, change parameters and print on-line, bar-coded labels and tags. These tasks can be performed without a need for any programming and without a need to download data to a personal computer, the vendor said.

Pricing ranges from $2,395 to $4,595, depending on type of hardware platform.

Cybra
One Riverdale Ave.
Riverdale, N.Y. 10463
(212) 601-7100

Computer-aided software engineering

Release 3.0 of Michaels, Ross & Cole Ltd.'s MRC-Productivity series of fourth-generation language and computer-aided software engineering tools for the IBM Application System/400 features an adaptable reporting facility designed for shops with a constant demand for information.

End users and programmers can modify reports before and after completion, and users can add or delete files and fields or resequence fields, the vendor said.

Prices range from $5,000 to $39,500, depending on model.

Michaels, Ross & Cole
450 E. 22nd St.
Lombard, Ill. 60148
(708) 916-0662

Cadware, Inc. has announced a personal computer-based computer-aided software engineering (CASE) product line that features multiple entry points.

Smartcase is a documentation tool that provides an entry point for customers to gain experience with CASE techniques. MS-DOS and OS/2 versions are priced at less than $300.

System Developer I is an analysis and design tool kit that features a rule-based editor. Pricing ranges from $499 for a single-user MS-DOS version to $1,999 for a multiuser network package.

System Developer II includes Metabase, a PC-based customizable repository that is based on an extended entity attribute relationship technology. A single-user MS-DOS version costs $3,499, and a multiuser network package is priced at $9,999.

Cadware
50 Fitch St.
New Haven, Conn. 06515
(203) 387-1853

Training

AMT Corp. has released CBI-Quick, a computer-based instruction generator that can be used to create realistic product demonstrations and interactive online user training for Unix and Digital Equipment Corp. VAX applications.

The product provides users with the ability to simulate real applications and port them across Unix- and VAX-based systems as well as MS-DOS-based IBM Personal Computers and compatibles.

CBI-Quick is priced at $16,000 for VAX and Unix versions. A one-year lease with a three-month initial training period costs $6,000.

AMT
183 Guggins St.
Boxboro, Mass. 01719
(508) 263-3030

Compilers

Telesoft has announced an Intel Corp. 80386-based cross compiler version of its Telegen2 Ada development system.

The product runs on Unix-based 80386 machines and can be used to produce embedded 80386 code.

It is compatible with AT&T's Unix System V, Release 3.0 and supports host and target boards in Multibus II configurations, the vendor said. A version for Digital Equipment Corp. VAX systems is also available.

Pricing for the product ranges from $13,000 to $85,000, depending on configuration.

Telesoft
5959 Cornerstone West
San Diego, Calif. 92121
(619) 457-2700

Kelly® Service Descriptions
The Kelly Service System
KELLY Temporary Services
The Kelly Girl® People – The First and The Best®

Announcing The Last Thing Our Competition Wants To Hear:

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Introducing the Kelly Service Descriptions—a totally new, simplified, flexible job description system for temporary help. To identify the work skills, experience level and equipment requirements of every assignment. For further information, call your local Kelly office.

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Introducing the Kelly Skills Review—a task-oriented testing procedure that tests real workplace skills. It's fully computerized. Independently validated. And carefully matched to the Service Descriptions. To ensure that the help you get is the help you need.

The Kelly Service System: What You'd Expect From The Leader.
Both the new Kelly Service Descriptions and Kelly Skills Review are part of the industry's most comprehensive quality assurance program: The Kelly Service System. It's designed to cover every aspect of customer service. From hiring, ordering and assigning—to follow-through.

KELLY Temporary Services
The Kelly Girl® People – The First and The Best®

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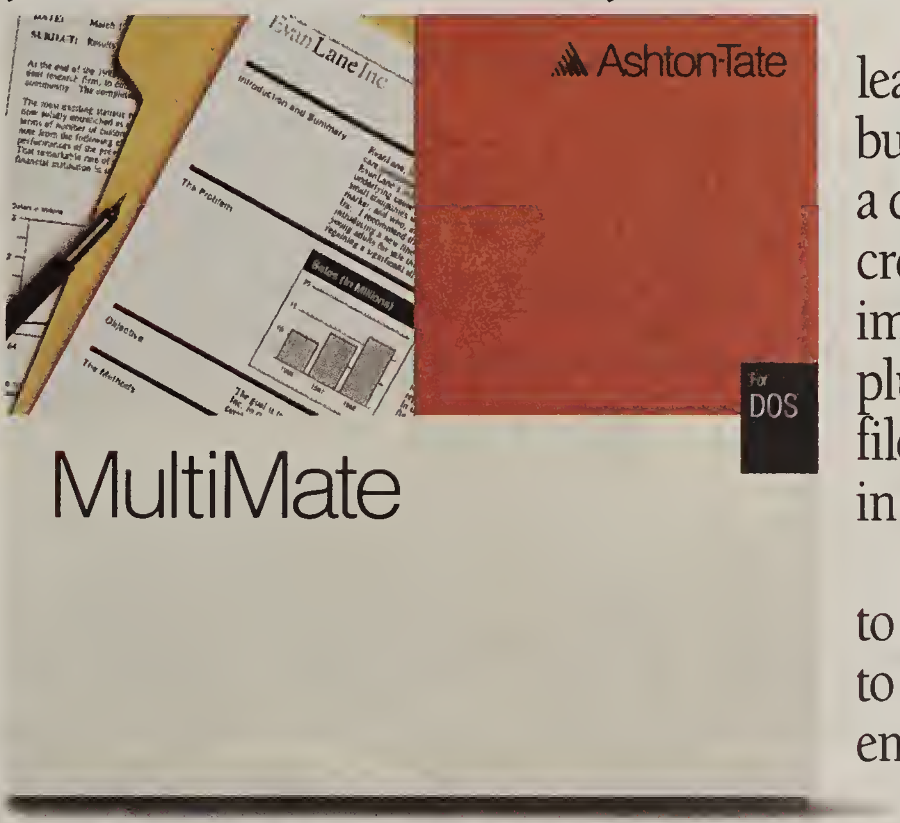
Introducing The First Word Processor Designed By An Army, A Telephone Company, Genetic Engineering, Atomic Research And, Of Course, The IRS.



It's true. A whole army of Fortune 1000 companies and government agencies are designing future versions of MultiMate. Including an actual army. And a think tank. A band-aid maker. Oil companies. And five major insurance firms.

The 140 members of the MultiMate Customer Advisory Board want cross-platform compatibility. So we're developing versions of MultiMate for Windows, OS/2, UNIX and Macintosh. These compatible programs will reduce training and support costs, while providing consistent, easy-to-use word processing across your entire computing environment.

The information professionals on the Board are also familiar with other popular word processing programs. They know which features are productive, which aren't, and what's missing. By listening to their advice, we give you a word processing product that's second to none.

Accomplishing this is a continuing process, but we've already added advanced features to MultiMate version 4.0 that include the industry's leading grammar checker, built-in electronic mail, a drawing function for creating forms, graphics importation and editing, plus the most extensive file conversion capability in the business.

We're also committed to regular, timely upgrades to keep pace with today's emerging technology.

For more information on the future of MultiMate, call 1-800-437-4329, Ext. 1909. Or upgrade to MultiMate version 4.0 now for only $75 by calling 1-800-2ASHTON.

If you want your word processor to be all that it can be, join the army of companies that have made MultiMate a major industry standard.

Ashton-Tate®

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NEW PRODUCTS - HARDWARE

Data storage

Matrix Corp. has announced a Motorola, Inc. VMEbus-based rugged memory board that includes up to 4M bytes of battery-packed random-access memory.

Mr-Ram was designed for use in harsh environments with extreme temperatures and vibrations. The board can operate as a 32- or 24-bit address slave, and it supports 8-, 16- or 32-bit data transfers, the vendor said.

The product is available in three versions that range in price from $895 to $2,995.

Matrix
1203 New Hope Road
Raleigh, N.C. 27610
(919) 231-8000

Cambex Corp. has announced a ¼-in. cartridge subsystem designed to be used with IBM RISC/System 6000 machines.

The Certainty 6800 Model 60 complies with the QIC-320 and QIC-525 tape standards and is read-compatible with smaller QIC-compatible devices.

The product is scheduled to begin shipping in November. The list price for a single unit is $3,455, and users who have Cambex tape drives on their RS/6000s can upgrade to the Model 60 for free.

Cambex
360 Second Ave.
Waltham, Mass. 02154
(800) 325-5565

I/O devices

Barco, Inc. has announced two 20-in. imaging color display monitors designed for use in process control, high-end computer-aided design applications and image processing applications.

The ICD 651 and ICD 751 can display source material with respective horizontal scan frequencies of 46.5 to 66 KHz or 66 to 78 KHz, the vendor said.

The ICD 651 is priced at $3,995, and the ICD 751 costs $4,095.

Barco
1000 Cobb Place Blvd.
Kennesaw, Ga. 30144
(404) 590-7900

Printer Products has introduced its PCPOS 2000, an open terminal designed for general retail applications.

The unit comprises a standard IBM Personal Computer AT-compatible motherboard, an AT- or register-style keyboard, a three-station receipt/journal validation printer, a 9-in. monochrome monitor and a steel cash drawer. Its motherboard provides Intel Corp. 80286-based processing with a maximum of 4M bytes of random-access memory. The product can print 40 columns at 3.4 line/sec. on 3½-in. paper or 80 columns on 4½-in. paper, the vendor said.

A basic unit costs $5,495.

Printer Products
25 Denby Road
Boston, Mass. 02134
(617) 254-1200

Power supplies

Exide Electronics Corp. has introduced a continuous, on-line power protection system designed for multiple workstations, high-end computer-aided design and manufacturing systems, local-area network systems and low-end Microvax and Application System/400 environments.

The Powerware Personal 2000 features 1.5- and 2-kVA power ratings, and for entry-level configurations, the product's standard internal battery provides up to 10 minutes of battery backup support.

Pricing on the product begins at $1,900.

Exide Electronics
3201 Spring Forest Road
Raleigh, N.C. 27604
(919) 872-3020

Computer Accessories Corp. has announced the next generation of its Proxima Power Directors line of power control centers.

The latest generation includes the Compact Power Director Model P25, which provides four outlets and a small footprint for floor-standing computers; the Power Director Model P3, which features five-outlet protection and a disk-storage pocket; and the Power Director Plus Model P15, which provides protection for Underwriters Laboratory-rated modem or facsimile lines.

Pricing ranges from $99.95 to $159.95.

Computer Accessories
6610 Nancy Ridge Drive
San Diego, Calif. 92121
(619) 457-5500

Liebert Corp. has added 150- and 225-kVA-rated models to its Series 600 line of uninterruptible power supplies.

The two models feature a 57-in. footprint and were designed for use during nonlinear load and overload conditions. A text-and-graphics LCD and four push-buttons enable users to access and manipulate menu-driven operations or call up a system's data, the vendor said.

Pricing ranges from $65,000 to $150,000, depending on kVA capacity.

Liebert
P.O. Box 29186
1050 Dearborn Drive
Columbus, Ohio 43229
(614) 888-0246

New Release 3.1
Featuring Project Analyzer™
Choose the project management system that goes the distance.

Every project encounters a few obstacles along the way.

As a manager, it's up to you to rise above them. Live up to your commitments. Bring your project home on schedule and budget.

Now, there's a project management system that's ready to go the distance with you—Project Workbench® Software - Release 3.1.

The more complex your project, the more difficult your mission, the more you need the power of ABT's Project Workbench.

Whether you manage one project or an entire department, the system gives you better control over resources than ever before. Assign people to tasks the way you want them to work. Shorten project duration and smooth out the workflow.

The fully integrated Project Analyzer™ lets you monitor trends, measure performance, view status, and track "earned value."

Create reports and analyze your entire project the way that makes the most sense to you and your team.

Project Workbench gives you the power to go far beyond the basics—blending peak performance with the highest level of usability.

See how far you can really go. Call ABT or your local dealer today.

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Meet the #1 Software for a Growing Family

The more you rely on the expanding family of VAX™ computers, the more you need the SAS® System—the leading data analysis and graphics software in the VAX market. No other software has the power and flexibility to handle *all* your data management, analysis, and presentation needs. Across the entire range of VAX systems.

The SAS System brings you more choices for data entry, retrieval, and management . . . report writing and graphics . . . statistical and mathematical analysis (including quality control) . . . business planning, forecasting, and decision support . . . operations research and project management . . . and applications development. All fully integrated. All backed by VMS–specific technical support, training, and documentation.

And now we've extended the family with specialized tools for evaluating VAX computer performance, as well as interfaces to popular data bases such as ORACLE® and Rdb.™ No wonder experts call the SAS System ". . . perhaps the most sophisticated and versatile family of products on the market."*

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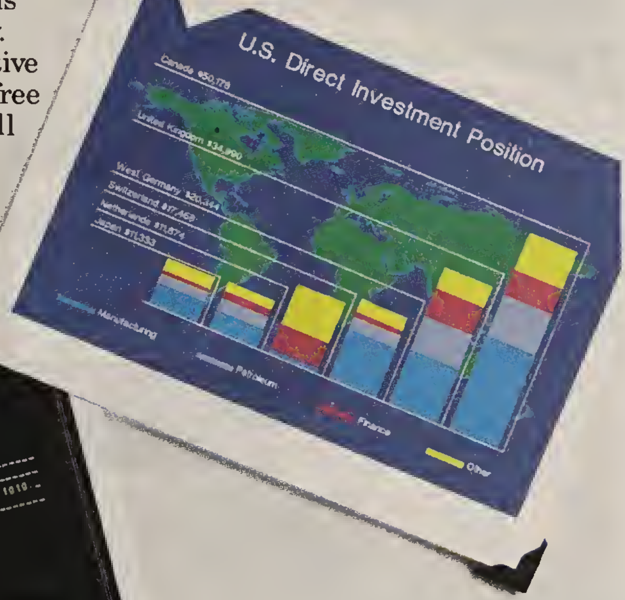
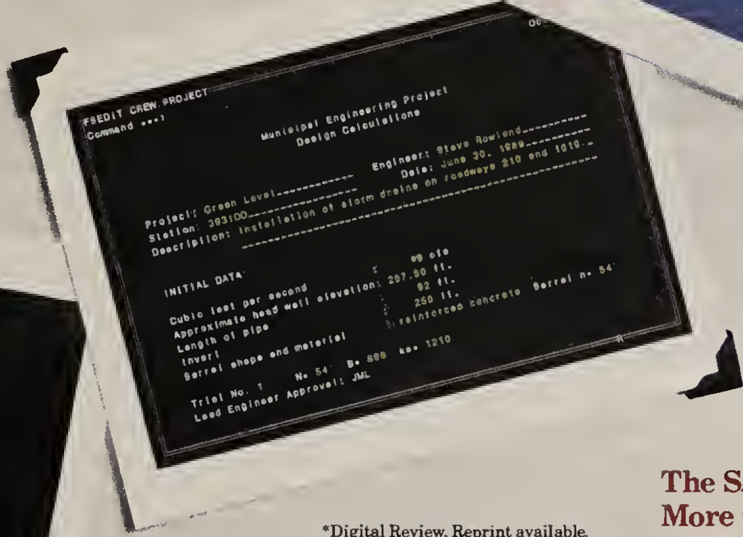
Find out why the SAS System is the software you won't outgrow. Ask for our free 12-page executive summary and details about a free 30-day software evaluation. Call us today at (919) 677-8200. In Canada, call (416) 443-9811.





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FSEDIT CREW.PROJECT
Command ===>
                         Municipal Engineering Project
                              Design Calculations

                                      Engineer: Steve Rowland________
Project: Green Level___________          Date: June 30, 1989_________
Station: 393100________________
Description: Installation of storm drains on roadways 210 and 1010._
             _______________________________________________________

INITIAL DATA                         :      99 cfs
Cubic feet per second                :  287.90 ft.
Approximate head wall elevation      :      92 ft.
Length of pipe                       :     250 ft.
Invert                               : reinforced concrete  Barrel n= 54
Barrel shape and material

Trial No. 1         N= 54    B= 899    ke= 1210
Lead Engineer Approval: JML
```

Page Fault Types over Time
For Collection MONITOR_6240
Fault Type:
DEMAND-ZERO
MODIFIED PAGE
WRITE-IN-PROG
GLOBAL PAGE
HARD FAULTS
Collected from 14MAR89 01 40:57 to 17MAR89 08:16:07
On Node VX6240

*Digital Review. Reprint available.

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PCs & WORKSTATIONS

COMMENTARY

Patricia Keefe

Sticky Windows

Time is money. Wordperfect — which one published report quotes as suggesting that delays in getting its own Windows word processor out the door may have pushed Lotus into buying Samna — expects to go into beta testing with that product next month. Delivery is slated for the first quarter. "I think Lotus paid quite a bit for a company [Samna] that does $20 million and barely breaks even," Wordperfect Vice President W.E. Pete Petersen said.

"Oh won't you show me the way?" Another source tells us that Wordperfect hired Guy Kawasaki, formerly at Apple and author of *The Macintosh Way*, to help design Wordperfect for Macintosh Version 2. The source claims that part of the deal calls for Kawasaki to "clandestinely" help promote the product as well. Kawasaki, of course, is no stranger to product endorsements. In fact, at a charity auction held during the the recent Agenda '90 conference, he donated a product endorsement that he quipped had a value of $9.99. It was purchased for $10,000 by Dave Weiner from Outlan.

Continued on page 56

Word gets better definition

Users find more intuitive commands, visual appeal in Microsoft update

BY JAMES DALY
CW STAFF

REDMOND, Wash. — Microsoft Corp. last week continued its efforts to shift its leading character-based applications to a more intuitive and visually appealing setting with the introduction of Word Version 5.5 for DOS systems, the latest version of its popular word processing application.

The updated application will adopt many of the graphical interfaces found in Microsoft Windows, OS/2 and Apple Computer, Inc. Macintosh environments, company officials said. For example, several features that were previously accessed solely from the keyboard can now be accessed through pull-down menus and pop-up dialog boxes.

Better commands

Early evaluators said they were most pleased with the elimination of sometimes archaic commands. For example, opening files is now done by typing in "File Open" instead of the older "Transfer Load."

"Commands just make a whole lot more sense, and I think that's going to really help sell it to new users," said Ronald Houck, senior systems designer at Marion Merrell Dow in Indianapolis.

Additionally, many common formatting commands will now be presented visually at the top of the screen through a ruler and ribbon, visual tools that allow users to apply common formatting preferences by a click of the mouse or a single keystroke. "The older formatting structure was a bit of a pain," said Sharon Brittingham, a member of the information center at Du Pont Co. in Wilmington, Del. "It's much cleaner to work with; it's more like Word for Windows."

The revamped application will also allow users to crop training time by sporting a common interface with Word for Windows, Word for OS/2 and Word for Macintosh. File transfer across the various platforms will also be available.

Special tools and options have been designed to ease the transition to Version 5.5. All files, glossaries, styles and dictionaries that were created in Version 5.0 can be used in Version 5.5 without modification, while a utility will be provided to help with the conversion of macros created with Version 5.0 so they can be used with Version 5.5. Users also have the option of choosing either Version 5.0 or 5.5 function keys.

Version 5.5 is available immediately at a suggested retail price of $450. Licensed users of Version 5.0 may upgrade for $50, while users of Version 1.0 through 4.0 may upgrade for $75.

FEATURE: CD-ROM ACCEPTANCE

Problems cloud bright promise

BY ALICE LAPLANTE
SPECIAL TO CW

David Flaherty

For some time, proponents of compact disc/read-only memory (CD-ROM) technology have boasted that all desktop computers — both personal computers and their more powerful siblings, Unix workstations — would soon ship with CD-ROM drives attached. However, there is not yet a CD-ROM drive on each desk, nor is there likely to be in the immediate future.

In fact, experts and users say, CD-ROM suffers from the same malaise formerly affecting other new technologies: Although promising and exciting in theory, it has some shortcomings that make it impractical for the majority of corporate end users. Cost and standard issues are said to be holding it back, but there are breakthroughs in these areas that may help CD-ROM in the long run.

"CD-ROM is an extremely immature market today: The baby has been conceived but is not yet born," says Bob Holmes, manager of systems evaluation at Southern California Gas Co. in Los Angeles. "The confusion in the market makes it difficult to make a wise strategic commitment to the technology," Holmes adds.

Confusion isn't the only difficulty. "The prices are still a bit steep," says Edmond Hamann, the library director of the Sawyer Library at Suffolk University in Boston, which has invested in a number of CD-ROM titles to help

Continued on page 58

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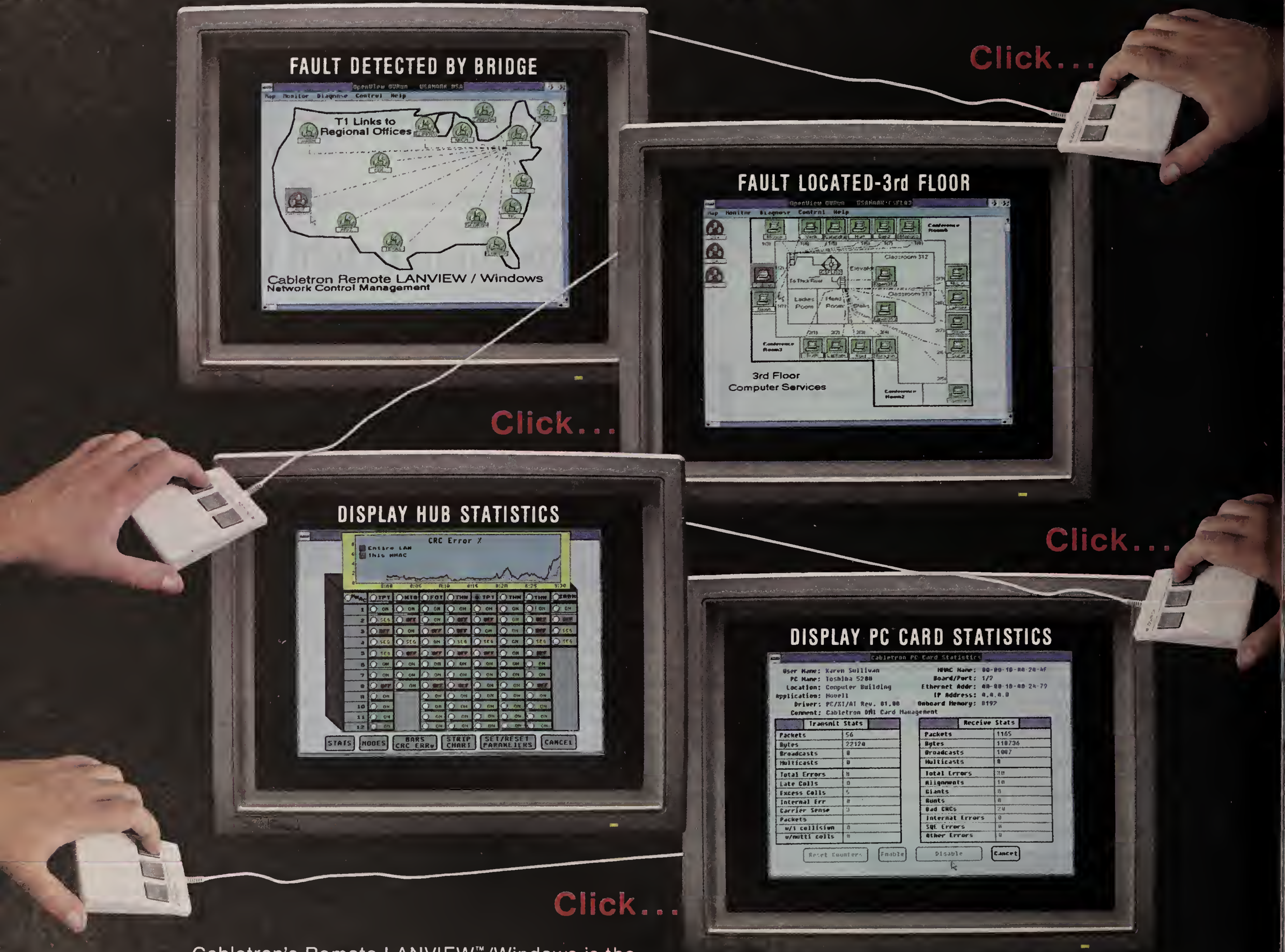

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Broadcasts	0
Multicasts	0
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Late Colls	0
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Internal Err	0
Carrier Sense	3
Packets	
w/1 collision	0
w/multi colls	0

Receive Stats	
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Bytes	118736
Broadcasts	1007
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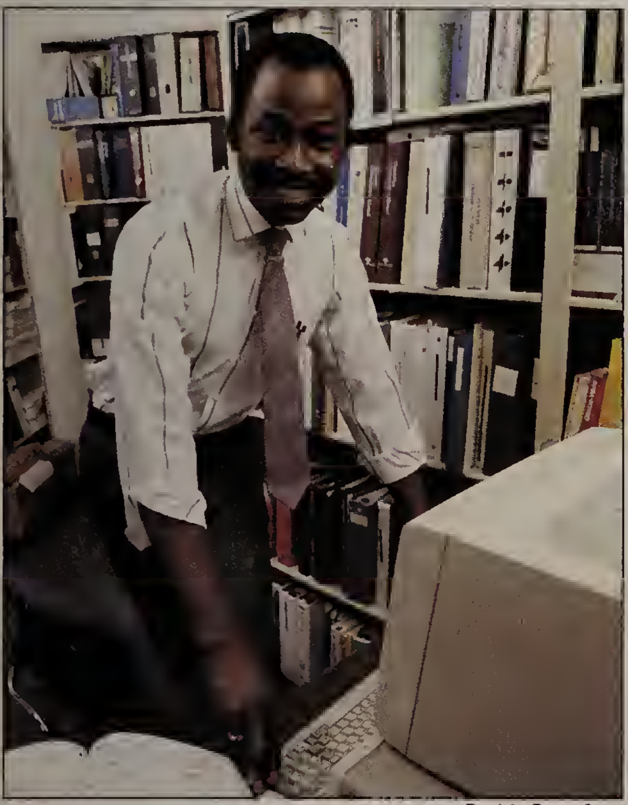
OS/2 system keeps tabs on health costs

ON SITE

BY RICHARD PASTORE
CW STAFF

ENGLEWOOD, Colo. — With health care costs ballooning like a battered ankle, firms are continually looking for some salve to temper the crippling effects. One answer is computer-assisted tracking of medical benefits use. With a handle on utilization data, companies such as US West can get a leg up on managing employee coverage costs.



Patricia Barry Levy

US West's Woods: *Goal is better data*

"To tailor a [health care] plan, you need to know which pieces are utilized and how efficiently they're being utilized," said James Woods, manager of benefits data support at US West.

To track four health care plans serving 64,000 employees and 130,000 dependents would be next to impossible to do internally, Woods said. The insurance carriers themselves could provide ad hoc utilization reports — but the fees would quickly add up. Turnaround would take a lengthy two weeks as well, he noted.

Instead, US West turned to Chap 2, a micro-to-mainframe system that analyzes and reports on data from multiple remotely located health care databases. The OS/2-based package, from Corporate Health Strategies in Westport, Conn., will handle an average large user's 2.5 million claims per year for a contract fee of $50,000 to $100,000.

The price seems hefty, but not in comparison to per-person benefit expenditures. These costs have risen 93% to nearly $1,400 since 1983, according to New York-based Metropolitan Life Insurance Co. Woods, who has been using the software for five months, said it is too early to tell what the payback will be, although it has allowed US West to do work internally that once was contracted out.

"The goal is to provide better data to our medical plan administrators," Woods said. With that data, the administrators can determine what portions of the plans could benefit from changes. For example, US West used Chap 2 data to determine that the number of psychiatric and substance abuse claims were excessive. Subsequently, a new limit was placed on reimbursement levels for these claims.

The company also uses Chap 2 data to support its benefits proposals when negotiating with trade unions. "It's easier to negotiate when both parties understand what's driving a particular change," Woods said.

Chap 2 also facilitates the firm's annual medical program review, which looks back over the year's claim data to determine a use baseline. "This is a fairly high-ticket item to get done," said Woods, noting that Chap 2 makes it possible to do the review in-house in one-third the time it took previously.

The ad hoc reports that once took two weeks now take two hours, he added.

The software's front end resides on an IBM Personal System/2 Model 55SX Running OS/2 Version 1.2. Here the user enters requests for reports on specific variables — for example, the cost of outpatient claims at a particular hospital, such as a comparison between the number of mental health claims from one plan vs. another.

The personal computer portion of the system then dials up the Hitachi Data Systems Corp. mainframe at Corporate Health Strategies, where complete claim data has been collected from tapes sent in by US West's insurance carriers. There the requested data is retrieved, sorted, tallied and downloaded to the PC for further manipulation.

Woods said the software is speedy and has worked out well despite the inherent difficulties of its OS/2 environment (see story below). "It has been excellent," he said, but added that the process for creating a report could benefit from shortcuts. He said the vendor could also make it easier to transfer report templates between databases. As it is now, templates must be rekeyed for each database.

Security has also been tightly monitored, he noted. "They have acted very appropriately in handling that," Woods said, adding that he has signed legal security contracts with Corporate Health Strategies to ensure protection.

He had the fever

When US West chose to use OS/2-based software to get a handle on health care costs, James Woods came down with a case of OS/2 disease.

"I was expecting the worst," said Woods, manager of benefits data support. Hoping an early start would help, Woods bought his first copy of OS/2 Version 1.1 six months before installing the health care data monitoring application, Chap 2 from Corporate Health Strategies.

Woods had little chance of getting any OS/2 advice in-house. "I could think of only two other people in the whole organization who use it," he said.

The symptoms began immediately. "All my existing software was DOS. Just getting things I could run under OS/2 was a problem" said Woods, who could not justify a separate system for an application that makes up only 30% of his duties.

The so-called DOS box or window included in OS/2 was too limited in memory to run most of Woods' software. It was also cantankerous to work with, he added.

Then came the support chills. "There weren't a lot of people knowledgeable about the products," he said. "I had to fumble with it until I got it to work."

Even IBM failed as a first-aid source. "I asked IBM for an upgrade from Version 1.1 to 1.2 in June and still haven't gotten a response," Woods complained. When it comes to questions, "They don't respond as promptly, if at all. They just don't seem to be giving it the support I'm accustomed to expecting from IBM."

Corporate Health Strategies chose to develop Chap 2 for OS/2 because it needed the memory management, multitasking and multithreaded capabilities of OS/2. Though he said few customers hesitated to accept OS/2, Director of Software Engineering Peter Spargo admitted that one potential customer refused the product partly because the customer lacked in-house support for OS/2.

Corporate Health Strategies has had to go out of its way to help some customers with the operating system. "They're the best knowledge base [on OS/2] I have access to," Woods said.

Study sees big year for Windows

BY PATRICIA KEEFE
CW STAFF

SAN DIEGO — Predicting that 1990 will be remembered as "the year of Microsoft Windows," Computer Intelligence has released the results of a survey that supports expectations of burgeoning acceptance of Microsoft Corp.'s Windows 3.0 in corporate America.

"The package is clearly the talk of the industry as users scramble to understand the nuances of implementing Windows in their organizations," said the report, which is based on interviews at sites with 500 or more employees.

The Windows tidal wave has hit the beaches so hard that, in some cases, users who were committed to OS/2 have backed away from that decision or pushed migration plans further down the road.

Even the release last week of IBM's 2M-byte OS/2 Standard Edition Version 1.3, which IBM concedes will have some overlap with Windows, is not expected to draw users away from Windows to OS/2 in great numbers [CW, Nov. 5].

However, based on its numbers, Computer Intelligence's prediction may be a bit premature. In the July interview period of its survey of user sites, Computer Intelligence found that 3% of corporate personal computers were running Windows. By year's end, these same users said that figure would rise only 1% to 4%. And by the end of 1991, that growth will have increased only to 6% of these users' PCs.

Until the May release of Windows 3.0, the 7-year-old Windows was hardly a smashing success. According to Computer Intelligence, Windows purchases had remained relatively constant during the last two years. The arrival of the radically revamped Version 3.0 changed all that.

In its first five months of sales, Windows has easily topped the million-units-shipped mark and quickly became the year's No. 1 seller for Egghead Discount Software. It should be noted that Microsoft has consistently declined to differentiate between units shipped and actual sales to end users.

Even an initial flurry of technical problems — despite one of the longest and largest beta tests of micro software — which at one point swamped Microsoft support lines, did not dampen sales.

> UNTIL THE May release of Windows 3.0, the 7-year-old Windows was hardly a smashing success.

During July interviews with users, Computer Intelligence's PC Market Monitor service found that Windows purchases increased to more than two times its 1989 average level. In August, after most of the problems with Windows had been addressed, or at least acknowledged, purchase levels jumped to five times 1989 levels, increasing the index to 5.7.

"While we don't expect this growth rate to continue at this pace, the rapid surge of acceptance is unprecedented," the report said.

In addition to tracking end-user purchases, Computer Intelligence also watched Windows growth by monitoring sales of four Microsoft applications that are directly affected by Windows' success: Word, Excel, Project and Powerpoint.

According to the report, of the four packages, Word has been the key beneficiary. Purchase levels have increased markedly in the last few months, increasing two to three times their 1989 levels during July and August interviews.

The other three applications have enjoyed a surge in sales in July but have since slipped to lower purchase levels, the study found. Excel purchases increased briefly to nearly two times its 1989 level in July, only to fall back to the 1989 level in August.

Windows versions of both Project and Powerpoint were first released in May. Project received quick acceptance, then increased slightly to more than 1.3 times the July sales level. Powerpoint doubled its June level, only to later fall 20% from its June purchase level.

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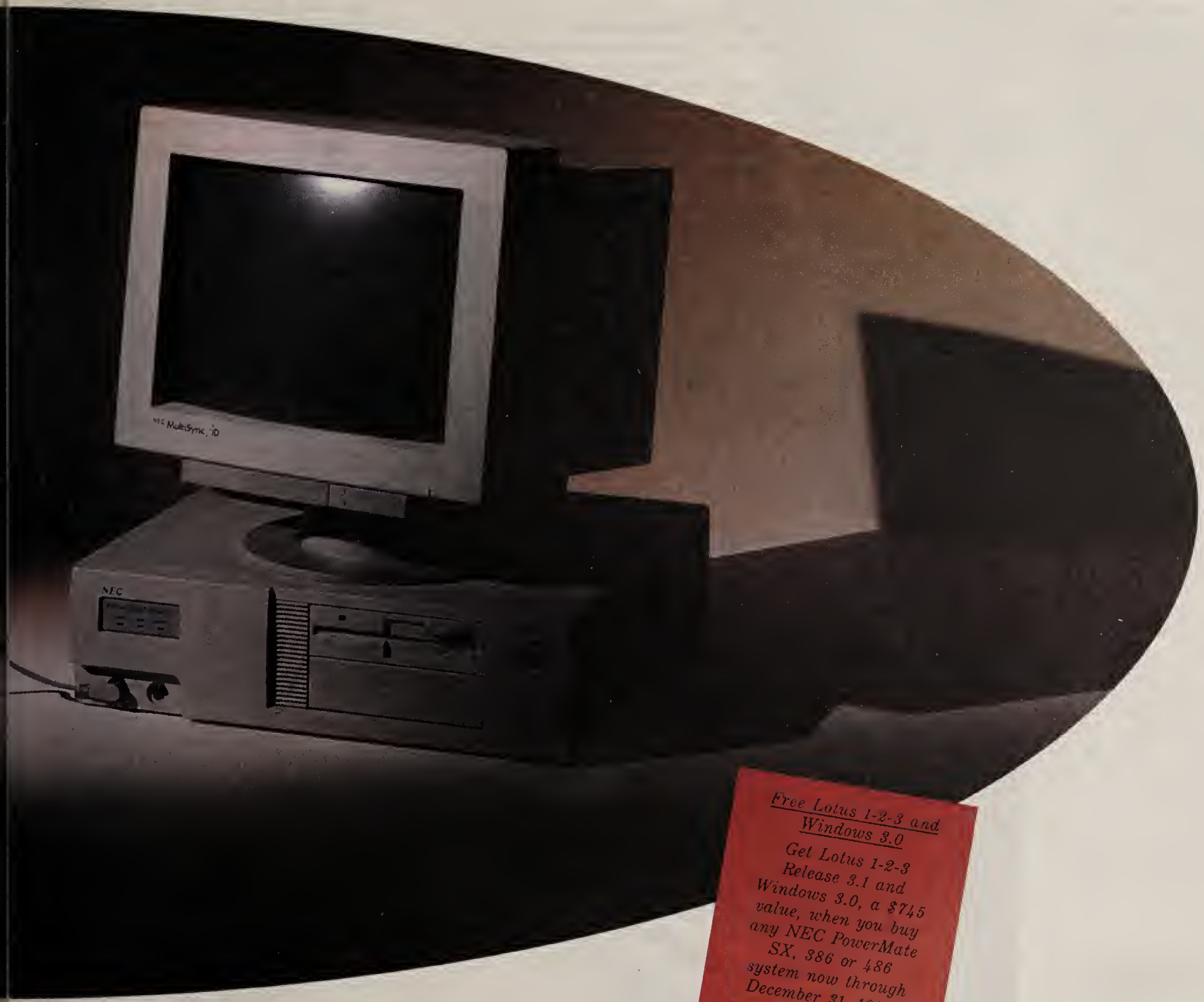

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Epson tries new design

BY MICHAEL FITZGERALD
CW STAFF

Epson America, Inc. announced a new product strategy on the desktop: It added several models to its lines and completed the phaseout of several older models.

The first of its new machines, the Equity 386/25 Plus, a 25-MHz machine based on the Intel Corp. 80386 chip, offers 32-bit Industry Standard Architecture that can hold up to 16M bytes of random-access memory on the system board and will support 1,024- by 768-pixel resolution. It will also feature a new case design that will be carried throughout the line, which will include an "easy accessibility" case that has no screws. This machine is scheduled to be available today.

The rest of Epson's new line will not be available until the first quarter of 1991. The new machines will include the Equity 286 Plus, based on Intel's 80286 chip, and several high-end computers that feature Extended Industry Standard Architecture and will be based on Intel's 80386/33-MHz or I486/25-MHz microprocessors. Epson expects to release these models in a variety of configurations and prices. The company only released prices on the Epson 386/25 Plus, which costs $3,499 with a single floppy disk drive and $4,999 for one with a 100M-byte hard disk drive.

Epson claims that all the new models will be easily upgradable.

Epson's Equity 1 Plus and 2 Plus machines were both phased out in late summer, followed by the 3 Plus at the end of October, as well as the 386SX and 386/20 machines. Epson continues to sell its Equity 1E and 2E computers, the 286E, the 386SX Plus introduced in July, as well as its NB3S notebook-size PC.

In addition, Epson is releasing a new monitor that will support Extended Video Graphics Array 1,024- by 768-pixel resolution for $689.

MICRO BITS

NCR gets drives

NCR Corp. tapped **Quantum Corp.** last month as its supplier of 105M-byte hard disk drives for various models of NCR's high-end desktop series. The Quantum Prodrive LPS is a small computer systems interface device with an average seek time of 17 msec.

National Semiconductor Corp. broke into the personal computer chip-set market recently with two single-chip controllers for the Intel Corp. 80286- and 80386SX-based market. PC vendor **Acer, Inc.** extended its previous alliance with National Semi to sell the chip sets.

Burlington, Mass.-based **Alpha Software Corp.** last week appointed **Fusion International** in Toronto as its sales, marketing and support services partner for the Canadian market. Fusion will act as Alpha's base of operations north of the border, marketing Alpha Four, the firm's relational database management and application development software.

HP aggressively cuts PC prices

BY J. A. SAVAGE
CW STAFF

At the end of each of the last three months, Hewlett-Packard Co. has announced rounds of price cutting on its Vectra personal computers totaling about a 25% decrease on its basic models. While the company said users should not expect more cuts this month, it indicated that prices have yet to bottom out.

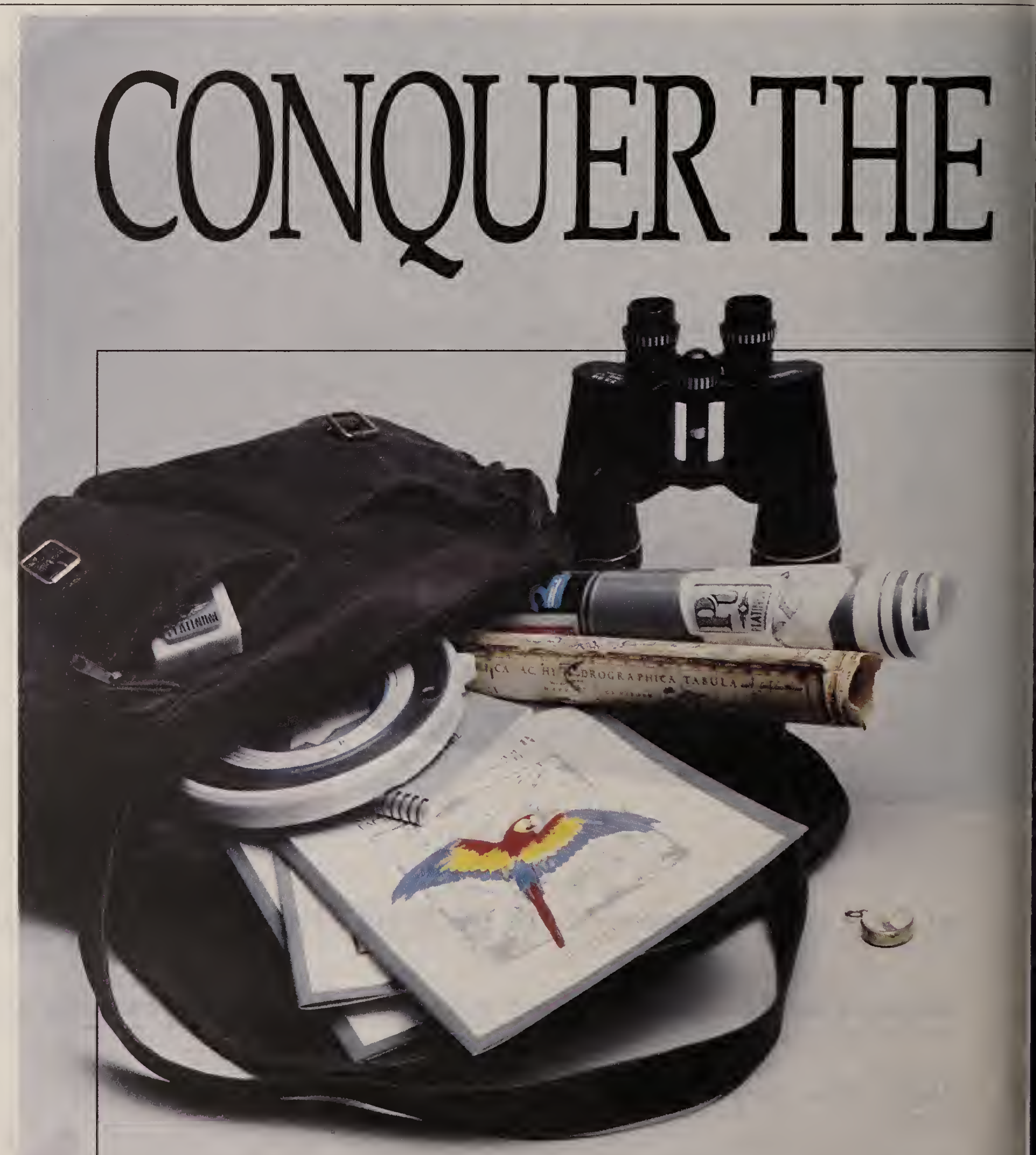
Noting that the price reductions are a signal that HP is dropping its timid marketing pace and becoming increasingly aggressive, Marc Lowe, HP's North American product marketing manager, said, "We're basically duking it out with IBM and Compaq [Computer Corp.]" He added that those two companies had made a few cuts in list prices but were recently cutting prices through promotions. "In the last few months, action in market has been much heavier than usual."

Price sensitive

The monthly reductions have not been interpreted as a sign of weakness by analysts. Mark Levitt, an analyst at International Data Corp. in Framingham, Mass., said HP is simply being more price sensitive than other companies. "They're evaluating prices every month. Most companies will only adjust prices once or twice a year."

HP's Lowe said the reductions have been great for business, but he would not say just how many units have been shipping. "People who never considered HP before are now considering us," he said.

Price cuts have affected computers based on both Intel Corp. 80286 and 80386 processors. For instance, since July, the Vectra 286/12 base model dropped 25%, from $2,399 to $1,799. The price of the OS/16S — based on the 80386 processor — dropped from $2,799 to $2,099 in the same time period. In addition to the competition-driven cuts, HP is also passing on savings it is realizing in materials, such as less-costly memory chips, Lowe said.



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Itasca DBMS promises power kick for Aviion

BY SALLY CUSACK
CW STAFF

MINNEAPOLIS — Data General Corp.'s Unix-based Aviion workstation received a potential power boost recently in the form of an object-oriented database management system from Itasca Systems, Inc.

According to Will Cappelli, vice president at New Science Associates, Inc., a market research and consulting firm based in Southport, Conn., "DG is very interested in the object-oriented programming paradigm. They see it as essential in supporting network and distributed computing environments and moving their proprietary customers to open systems platforms."

The Westboro, Mass.-based minicomputer vendor initially entered the world of object-oriented technology back in 1989 with the announcement of CEO Object Office. That integrated office automation product incorporates DG's implementation of Hewlett-Packard Co.'s New Wave and Microsoft Corp.'s Windows Version 3.0 and serves as an object-oriented interface for local-area network-based personal computers connected to MV hosts.

The Itasca Odbms is a distributed, multiclient, multiserver system designed specifically to support highly complex workstation applications. According to the vendor, it is targeted at computer-aided design, manufacturing and engineering and computer-aided software engineering applications.

The DG Aviion/Itasca software port, completed earlier this month, rounds out Itasca's presence in the workstation marketplace. The package currently runs on Sun Microsystems, Inc., Silicon Graphics, Inc. and HP platforms.

All single-version copies of Odbms are priced at $3,995 for the first client/server configuration. To date, no orders have been placed for the Aviion version.

New breed of management

BY ELLIS BOOKER
CW STAFF

MOUNTAIN VIEW, Calif. — Consilium, Inc. believes that its new, workstation-based factory-floor management system establishes a new category: straddling the business planning systems used by manufacturers to process customer orders and make long-term schedules and the stand-alone systems and real-time controllers and sensors that sit on the factory floor.

Consilium unwrapped Flowstream last week and will demonstrate the product, jointly developed with Digital Equipment Corp., this week at Autofact '90 in Detroit.

Defined as an integrated execution system, Flowstream takes orders released from a manufacturing resource planning (MRP) system and optimizes their scheduling through the factory.

"Our system looks at performance against perfection and tells where the areas of improvement are," said Jonathan Golovin, Consilium's chairman and founder.

The product also breaks up categories by using workstations (DEC Vaxstations) as its platform. Most factory management systems use minicomputers; a few use personal computers.

Appearances deceiving

Golovin estimated that the U.S. market for factory-floor management systems is about $2 billion. "But at least three-quarters of that are internally developed solutions," Golovin said. So the market for vendor-provided systems is actually less than $500 million, with only about $120 million of that being for integrated factory systems such as Flowstream.

According to Martin Piszczalski, director of the manufacturing automation planning service at The Yankee Group in Boston, MRP systems do not typically monitor how the factory is performing, which can cause the factory and the grand plan to get out of whack. "People work from the paper schedule generated by the MRP for days or weeks, but this plan is not responsive to problems on the floor or new customer orders," he said.

In addition, customers are increasingly insisting on quality statistics from their manufacturers, but existing methods for getting this quality data from the factory floor to the MRP "are pretty feeble," Piszczalski said.

Flowstream has been implemented on the Vaxstation workstations under the VMS operating system and uses many of DEC's Network Application Support tools.

Interfaces between the Decwindows-based Flowstream and other systems are provided through DEC's Decnet/OSI network, object-oriented programming, the VAX RDB/VMS relational database and the CDD Repository.

Consilium and DEC began their relationship in 1982, when the latter funded development of Consilium's first product, Workstream. Last year, DEC bought $3 million of Consilium's common stock to take a 5.8% equity stake in the company.

Flowstream is currently available. Prices start at $30,000.

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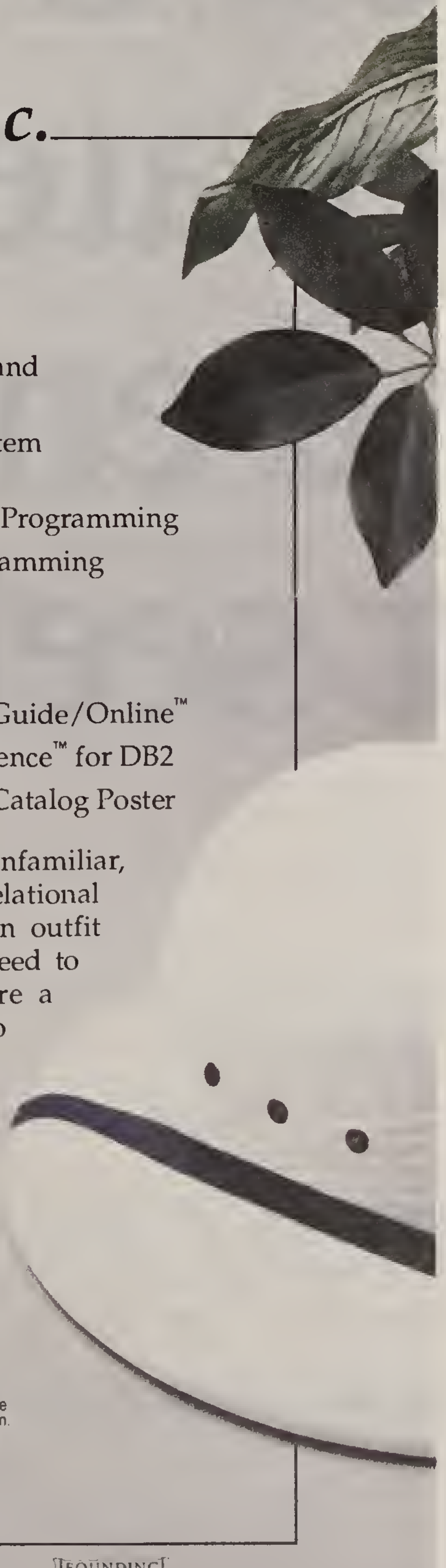

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IBM fills in 386-based PS/2 line, lowers prices on several versions

BY RICHARD PASTORE
CW STAFF

While new OS/2 features and server versions of the Personal System/2 were the main courses at IBM's announcement party late last month, the company put plenty more on the table.

IBM filled out the PS/2 Model 80 line with one 25-MHz Intel Corp. 80386-based system with a 160M-byte small computer systems interface (SCSI) hard disk drive and two 20-MHz 386-based systems with 160M-byte and 80M-byte hard disks. The Model 80-A16, 161 and 081 are priced at $10,195, $7,495 and $6,845, respectively.

The firm also unveiled the PS/2 Model 65, a 16-MHz Intel 80386SX-based unit with a 320M-byte hard disk. The machine costs $7,945.

In the storage arena, the company added a 2.3G-byte SCSI tape drive and an external storage tower to house up to seven SCSI storage devices. The units cost $6,550 and $6,500, respectively.

Both of the new server models [CW Nov. 5], the PS/2 Model 90 and 95, offer the option of a 256K-byte, level-two disk cache in addition to the built-in 8K-byte cache. The cache controller costs $1,995.

The 33-MHz Intel I486 upgrade board for PS/2 Models 90 and 95 was announced at a price of $2,500, while the Extended Graphics Array adapter (an option for all PS/2s based on the 386SX or greater) costs $1,095.

IBM cut prices between 8% and 25% on several versions of the PS/2 Model 70 as well as the Model 80 A21. The 486 Power Platform upgrade price for the Model 70 dropped to $1,900 from $3,995.

All new products are now shipping, IBM said.

Keefe

CONTINUED FROM PAGE 47

Report from the front. Lotus, meanwhile, continues to play coy on the delivery of 1-2-3/W, its fully Windows 3.0-compatible spreadsheet. But a user source, who saw 1-2-3/W two months ago, says his understanding is that 1-2-3/W will go beta in the second quarter and ship in the third. Needless to say, the longer Lotus takes, the better for Borland and Microsoft.

An ounce of prevention. The Lotus copyright infringement suit may be having more of an impact on Borland than it wants to admit. An attorney specializing in copyright law suggested recently that Borland might consider dropping the 1-2-3 menu option offered under Quattro Pro Version 1.0 until the suit is settled. Two weeks ago, Borland execs out making the rounds with Quattro Pro Version 2.0 pooh-poohed the idea. Yet two users who have loaded Version 2.0 report that during the initial installation, you no longer get the option of loading up the 1-2-3 menu. You can go back later and add the Lotus menu. In Version 1.0, during the initial installation, users can choose between two Quattro Pro interfaces and the 1-2-3 menu.

Defensive offensive. One interesting take on the Lotus buyout of Samna comes from Wall Street contrarian Bob Therrien at Paine Webber. He points out that Lotus is filing suits left and right for alleged copyright infringement. Lotus has already forced one offender off the market, and a win against Borland could cut down Quattro Pro as well. Meanwhile, Lotus is turning up the jets in the Windows market, the future of which ironically hinges on the outcome of the *Apple v. Microsoft* copyright infringement trial. This amuses some, given Lotus' general position on intellectual property rights. Therrien doubts Windows will come off the market, although he says the price may shoot up. Either way Lotus is safe. It now has a Windows word processor and some products in development if Windows sails forward; and if it doesn't, well, Lotus was always betting that way anyhow.

Attention Manuscript users. Lotus and Samna have said they will support, but neither enhance nor merge, their respective character-based DOS word processors. Microsoft, however, has just shipped the latest version of Word for DOS. As for Symphony, one user was quick to note that Lotus has been strangely quiet on the topic of porting Symphony to Windows. "I have the feeling it's a dead product, that their last upgrade was it," he said.

Bring the No-Doz. Many industry observers are expecting Comdex/Fall '90 to be something of a yawner this year. For example, so few press conferences have been scheduled for the five-day show that sponsor Interface Group was able to fit them all onto one page. Ordinarily, the list goes on for pages. A spokesman says there will be plenty to see. He claimed preregistration of attendees is up well over 100% over last year.

Keefe is *Computerworld's* senior editor, PCs and workstations.

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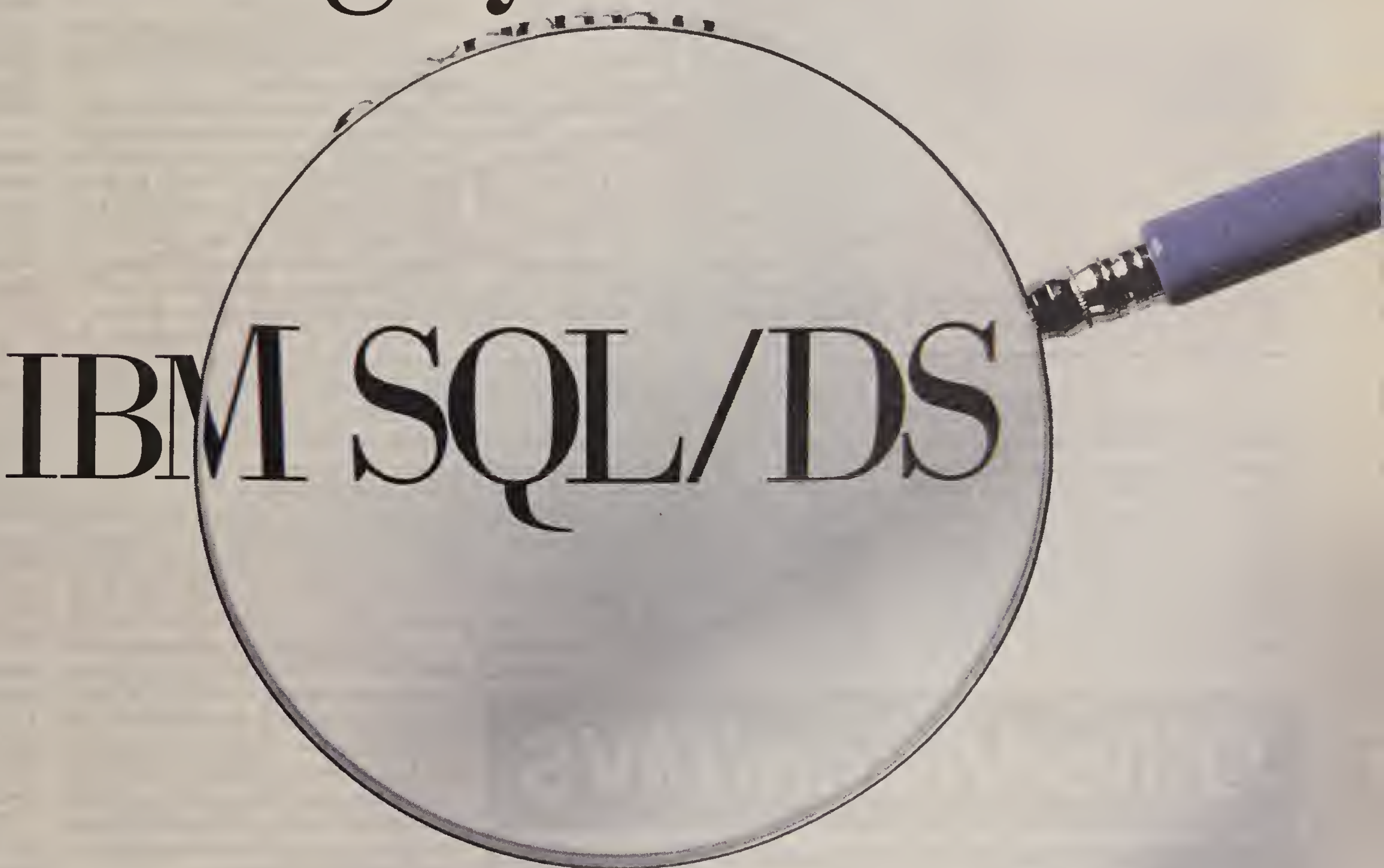

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Problems

CONTINUED FROM PAGE 47

students research more efficiently. Prices for CD-ROM drives range from $500 to $1,000.

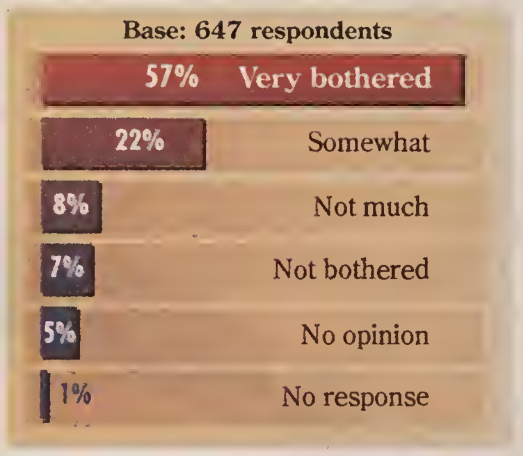
Although prices for commercial CD-ROM titles have been diving, the costs for a corporation to design and make its own CD-ROM applications for internal use remain prohibitively high. Software licensing costs remain a strong deterrent to internal CD-ROM development.

But by far the biggest cost, says John Nairn, vice president of research and development for CD-ROM tool kit maker Reference Technology, Inc. in Boulder, Colo., is getting the desired information into electronic form, such as transferring textual information into an ASCII file or graphic information into electronic form.

The task is enough to discourage many organizations from moving data to CD-ROM. Southern California Gas, for example, has put on hold a project to equip trucks with CD-ROM readers that would replace the huge instruction binders now in use. The reason for the delay is that much of this information is in graphical form. "There is currently no consensus on the right way to handle this," he says.

Does CD-ROM interface switching bother you?

Switching from one CD-ROM disc to others that use different retrieval software and user interfaces is irksome for a majority of users



Source: Helgerson Associates, Inc. CW Chart: Paul Mock

The fragmentation of the PC world into DOS, Macintosh, Unix and OS/2 segments hasn't helped CD-ROM acceptance. Vendors cannot reach all potential customers, thus reducing the number of titles available on any given platform.

What would help? Standards. But each CD-ROM title now comes with proprietary search-and-retrieval software, and there is a bewildering array of tools available for those corporations that want to create their own CD-ROM offerings.

"There is still no standard front-end interface across CD-ROM products," says Mark Margevicius, a consultant in the new product review department at the Society National Bank in Cleveland.

Potential nightmare

For people using only one CD-ROM product, this is not a problem; but for those who need to access a variety of titles from different vendors and publishers, it can be a severe handicap.

"Our librarians have to learn 10 to 15 different systems," says Marilyn Grant, coordinator of computer search services in the main library at Boston University. "Often we get bogged down trying to remember what system we are on and what the proper command or keystroke is."

"Most CD-ROM publishers assume that their disks will be used exclusively, and so don't take into account that other titles from other vendors work differently," says Bill Perry, director of research at Helgerson Associates, Inc. in Falls Church, Va., which publishes the "CD-ROM End User" newsletter.

Moreover, the retrieval software can take up as much as 5M bytes on a user's hard drive. Although on a 100M- or 200M-byte drive this is not a problem, it can be for users with 40M-byte hard drives.

"That is an issue that individual users need to consider if they want to use CD-ROM," says Bob Martin, manager of executive support systems at Eaton Corp., where company executives use several CD-ROM subscription services.

Others say this is not a problem.

"To take 4M or 5M bytes in order to get access to 600M bytes is not a bad trade-off," Margevicius says.

While drive space may not be a problem for some users, learning new retrieval software may be. According to recent research by Helgerson, a whopping 79% of CD-ROM users surveyed were either somewhat (22%) or very (57%) bothered by having to learn new retrieval software with each new package (see chart).

Evans says that once his firm begins widespread distribution of CD-ROM applications through a local-area network, this could become an issue.

The lack of standards remains the chief obstacle to the proliferation of CD-ROM applications, users say.

Map maker Jeppesen Sanderson in Englewood, Colo., has embarked on an ambitious project, called the Electronic Library System, to convert to CD-ROM its mapping information for airlines and pilots. Jeppesen, the airlines and aircraft manufacturers are having trouble agreeing on a format, says Gary Porter, project coordinator for electronic data services.

CD-ROM is being considered for ground-based chart information that pilots could hook into via a network; rewritable optical technology is being considered for a cockpit-based database.

Down but not out

Such barriers as a lack of standards may keep CD-ROM down for a time (some analysts say as long as two years), but factors are at work that may speed CD-ROM acceptance in the corporate environment.

E. J. Jerry McFaul, a computer scientist at the U.S. Geological Survey in Reston, Va., says he expects CD-ROM hardware prices to drop dramatically in the next few months. McFaul is chairman of the Special Interest Group on CD-ROM Applications and Technology, a group he founded four years ago to provide a forum for people interested in developing or using CD-ROM technology.

"We expect drive prices to drop within 90 days," McFaul says. "We'll see the magic $500 — if not $400 — limit broken within that time."

The reason: The U.S. Department of Defense (DOD) recently awarded Sony Corp. a $12.1 million contract for a two-drive unit to sell for $576. DOD will buy 22,000 drives in 1991 with options to extend the contract in 1992 and beyond.

"This is a significant price drop and should signal a big breakthrough because other companies are bound to follow suit," McFaul says.

Furthermore, the cost of the CD-ROM titles themselves are already decreasing in the government arena, and private sector prices are likely to follow, he says.

The U.S. Geological Survey puts out a $28 CD-ROM disc called the Digital Line Graphic, a mapping disc based on a USGS database. "The equivalent magnetic version costs $1,400," McFaul says.

Private publisher Quanta Press has a $99 offering that is based on a government database called Agricola, which contains federal research data on agricultural issues. The product includes a more than 400M-byte database.

Getting it together

Most significantly, however, vendors are finally getting together to discuss standardizing on retrieval software and consistent user interfaces. According to Nairn, one proposal is based on a client/server model.

In this model, software can be used in a modular fashion; users can pick the interface (the client) they like, and vendors can choose the retrieval engine (the server) that suits their needs.

McFaul points to three committees working on defining CD-ROM standards:

- The client/server model is being proposed by a committee formed by 15 agencies in the U.S. intelligence community, including the FBI and the CIA.
- One effort, organized by the U.S. Air Force, is working on specifications for a common index algorithm to be used with text databases.
- A group headed by the Library of Congress is standardizing the user interface so that basic commands or key words are consistent across vendors' products.

However, whether CD-ROM vendors will adhere to these standards remains to be seen, McFaul says.

For its part, Microsoft Corp. is promoting the High Sierra specifications in an attempt to define a universal standard that all vendors must adhere to in writing their software.

Moves such as these have CD-ROM market forecasters optimistic. Freeman Associates, Inc., a Santa Barbara, Calif.-based market research firm, predicts that in 1990, over 400,000 CD-ROM drives will ship to the U.S. market. Market research firm Infotech in Pittsfield, Vt., puts that number even higher: In 1990, it projects that 766,324 will be sold, and in 1991, it expects that number to be 1.7 million.

LaPlante is a free-lance writer based in Palo Alto, Calif.

CD-ROM: Right to not write

Until fairly recently, many analysts predicted that optical discs would not be in widespread use until they were rewritable. However, most experts now say that was a misleading red herring.

Instead, these are two different technologies for two different markets. CD-ROM is best used for storing and retrieving information that remains static; rewritable drives are just another form of mass storage.

"It is actually an advantage that you cannot write to the disks in CD-ROM," says Shahzad Bashir, a senior manager at Arthur Andersen & Co. "If you are sending out important information, you'd like to preserve the integrity of that information."

E. J. Jerry McFaul, a computer scientist at the U.S. Geological Survey, says that once it is understood that CD-ROM is a publishing medium, the confusion between it and rewritable drives vanishes.

Another reason that the rewritable technology is no longer seen as the Holy Grail of optical storage is that it is too expensive.

The drives are five to 10 times more expensive and the media from 50 to 100 times more expensive than CD-ROM disks.

There is also a disadvantage in replication: Rewritable is slow and must take place in real time. Thus, if it takes an hour to make one duplicate of a rewritable CD, it would take 100 hours to make 100 duplicates.

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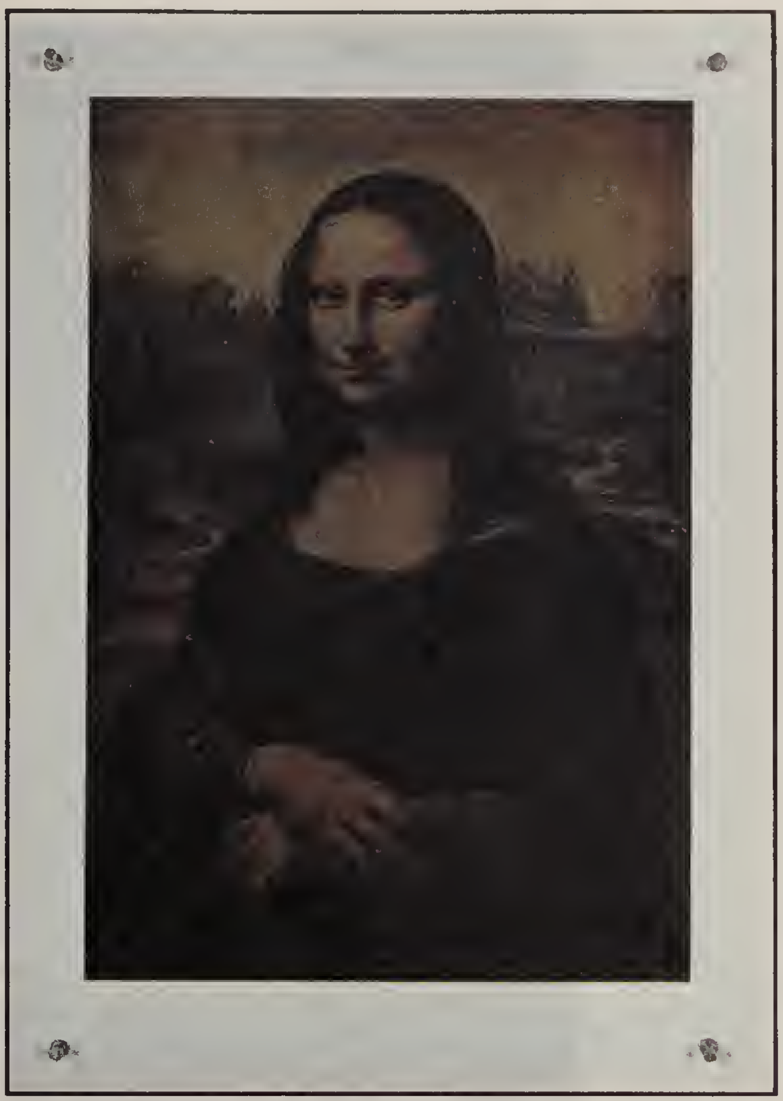

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That's a pretty impressive number of RISC systems. But the numbers that will impress you more are right on your bottom line. Our RISC minicomputers start at under $15,000. Our high end of the power spectrum gives you mainframe performance at minicomputer prices.

Of course, the initial price is only one part of the equation. Since RISC architecture is simpler, it's fundamentally more reliable. And that means lower maintenance and service costs. In short, a dramatically lower cost of ownership.

If you think you can get these advantages from DEC and IBM, think again. DEC doesn't offer a complete range of RISC systems. And IBM only offers RISC technology in workstations.

The competition can't offer you the same level of software compatibility, either. If you went with IBM, you'd have to migrate across different families to even approach the range of computing power we can provide in a single compatible HP systems family.

Finally, power that people find easy to use.
That's the whole idea behind HP NewWave Office system. Its unique object-based technology lets all of your information resources work together. And gives users a consistent interface across mainframes, minis, workstations and PCs.

It also integrates information from your current applications and integrates existing DOS applications, regardless of the vendor. IBM OfficeVision doesn't. What's more, HP NewWave Office is based on industry-standard networking, and runs on HP's UNIX® system-based computers, HP 3000 systems and OS/2 operating systems.

Beyond this, HP NewWave Office incorporates an extraordinary new "agents" capability. Agents can handle a wide range of sophisticated tasks. For instance, they can automatically gather data, analyze it, generate a report and distribute it.

The net result of HP's approach is this: Applications and information are right where people want them—at their fingertips. Which puts real power where it's needed most. The kind of useful power you always hoped to get out of your company computer system.

Call us at **1-800-752-0900, Ext. 1477** for more information. We promise a very powerful experience for you, and for everyone else in your office.

hp HEWLETT PACKARD

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NEW PRODUCTS

Systems

Topline Technologies, Inc. has added a 25-MHz tower chassis system to its line of IBM Personal Computer AT-compatible computers.

The stand-alone system can be expanded to a multiuser configuration or used as a file server. The Intel Corp. I486-based unit includes 8K bytes of internal cache with an optional 128K-byte burst-mode direct-mapped secondary cache. The system's board supports 256K-, 1M- and 4M-byte dynamic random-access memory chips for memory configurations of up to 64M bytes, the vendor said.

The list price for a basic system is $5,395.

Topline Technologies
330 E. Orangethorpe Ave.
Placentia, Calif. 92670
(714) 524-6900

Software applications packages

Cad Technology Corp. has announced the ML2-HST data library, a set of symbols used in mechanical drafting and design applications that require high-strength fasteners.

The library includes graphic representations of parts defined and made by SPS Technologies for hexagon and double hexagon nuts and bolts hardware. The product contains top and side views for more than 140 component types and more than 3,100 database files.

Single-user pricing is $375.

Cad Technology
P.O. Box 034089
Indialantic, Fla. 32903
(407) 773-5142

Version 2.0 of Zsoft Corp.'s Publisher's Paintbrush, an image editing and paint program that is designed to operate in Microsoft Corp.'s Windows real-, standard- and enhanced-mode environments, is scheduled to begin shipping in the first quarter of 1991.

The product includes word-search capabilities and a glossary, explanatory pictures and graphics and a histogram equalization feature that assists users in constructing detailed images.

Version 2.0 is priced at $495, and registered users of previous versions may upgrade their systems for $75.

Zsoft
450 Franklin Road
Marietta, Ga. 30067
(404) 428-0008

Group Technologies, Inc. has announced an interactive real-time document conferencing software package designed for Apple Computer, Inc. Macintoshes.

Aspects Version 1.0's collaborative computing capabilities enable users in multiple locations to simulate a conference room environment by using networked or modem-linked Macintosh systems.

The program is priced at $299.

Group Technologies
1408 N. Fillmore St.
Arlington, Va. 22201
(703) 528-1555

Reference Software International has released Grammatik Mac Version 2.0, an upgrade of its grammar-checking software package for Apple Computer, Inc. Macintoshes.

The product includes a proofreading rule base and a Help system. Users are able to make their own writing style guides, and a rule/Help editor allows writing rules to be added, modified or deleted, the company said.

Grammatik Mac Version 2.0 is priced at $99. Users of Grammatik Mac Version 1.0 can upgrade their systems for free.

Reference Software International
330 Townsend St.
San Francisco, Calif. 94107
(415) 541-0222

Software utilities

Geographic Data Technology, Inc. has released an updated version of Zone Ranger, a personal computer software package and geographic database utility designed to automate map-zoning applications.

The product enables users to create and modify custom zones directly on a computerized map and to record streets and addresses within specified boundaries.

A one- to five-user package is priced from $2,000 to $20,000, depending on type of geographic database included.

Geographic Data Technology
13 Dartmouth College Highway
Lyme, N.H. 03768
(603) 795-2183

HDC Computer Corp. has announced a pop-up utility designed for Microsoft Corp. Windows environments.

HDC Icon Designer includes more than 125 icons, and users can create their own icons from the product's 16-color palette. The product can be accessed from within any Windows application running on a Windows-compatible personal computer. HDC Icon Designer is scheduled to begin shipping in the middle of this month at a price of $59.95.

HDC Computer
6742 185th Ave. NE
Redmond, Wash. 98052
(206) 885-5550

Continued on page 66

How XDB Stacks Up As A DB2 Development Tool.

Only XDB is 100% DB2 compatible and gives you mainframe power on your PC.

That's right, XDB lets you offload DB2 development onto a PC. Consider the productivity gains and mainframe resource savings!

With XDB, any DB2 programmer can develop, test, and run applications on a PC and then run the finished code — without modification — on the mainframe.

If you want, you can even run DB2 applications on a LAN with the powerful XDB-Server. Imagine the benefits of downsizing mainframe applications!

DB2 On Your PC.

XDB's SQL engine supports all mainframe DB2 SQL syntax, imports and exports DB2 data and schema, and works with both ASCII and EBCDIC. Its mainframe power includes dynamic SQL, domain and referential integrity, updatable views, transaction management, backup/recovery, security, data dictionary, and automatic record and table locking. And yes, it will do all of this on your PC under DOS, OS/2, or Windows 3.0.

In fact, the XDB SQL engine is so compact that it runs on any PC in under 300K, leaving plenty of room for your application.

And you can access mainframe DB2 data with the XDB-Link gateway.

COBOL And C With SQL.

XDB lets you write programs with embedded SQL in COBOL or C. The XDB-Workbench integrates seamlessly with the Micro Focus COBOL/2 Workbench enabling you to take full advantage of a rich programming environment.

Rapid Application Development.

XDB provides tools to further increase your productivity.

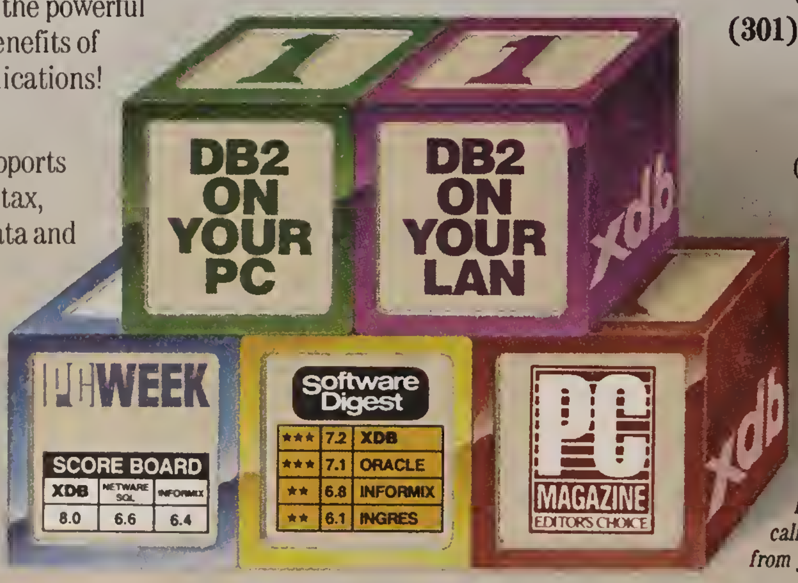
Our visual Report Writer makes report development intuitive and our Forms Generator lets you paint sophisticated data entry and transaction screens.

Top Rated SQL Product.

In review after review, XDB products consistently receive the highest ratings. *PC Magazine* named XDB an "Editor's Choice." *Software Digest* ranked XDB first among advanced SQL products. And *PC Week* ranked XDB tools first among Client/Server database systems.

When you scrutinize our products the way experts do, we think you'll agree: XDB offers productivity benefits no one else can match.

Get the details. Call today at **(301) 779-6030.**



XDB Systems, Inc.
7309 Baltimore Ave.
College Park, MD 20740

xdb

We Put DB2 On Your PC.

See Us At COMDEX Fall
Booth #500

Fax (301) 779-2429. For instant information, call our Fax BBS (301) 779-4560 ext. 1045 from your Fax machine.

"The only tool available that adheres closely enough to IBM's DB2 to allow applications developed on the PC to be migrated to the mainframe with little or no modification." PC WEEK

"Speedy performance, a rich SQL implementation, and general ease of use make this package a winner." PC MAGAZINE

"XDB offers strong capabilities for advanced database management with PC ease of use." INFO WORLD

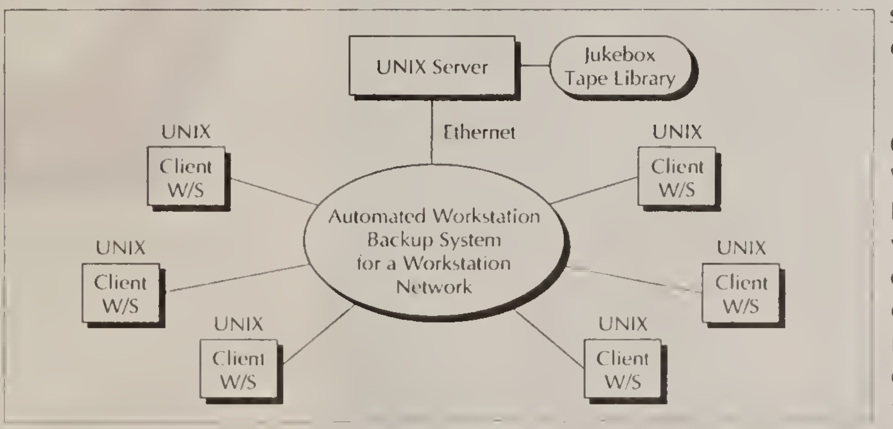
"Develop on PCs then run the finished software without changes against DB2 data on mainframes thanks to XDB's DB2-compatible database server software." DBMS

©1990 XDB Systems, Inc. XDB is a registered trademark of XDB Systems, Inc. Product names are trademarks or registered trademarks of their respective holders. PC WEEK 6/89, 7/90, DBMS 1/90, Data Based Adviser 2/88, Info World 1/90, PC Magazine 5/88, Software Digest 9/87

Jack up your backup!

With the multivendor Automated Workstation Backup System from Control Data. It's a turnkey hardware, software and support solution that delivers unmanned, "lights out" file backup and restoration control throughout your Ethernet network. So you can put an end to compromising your critical company data and reduce costly network downtime.

The Automated Workstation Backup System features a UNIX server, which is also configurable as a daytime compute server. And, it delivers a feature-rich, menu-driven environment for performing multiple levels of full, incremental, or off-line backups for Sun, HP, Apollo, SGI and Control Data workstations. Completing the system is a jukebox tape library that utilizes helical-scan technology and offers unlimited storage with removable carousels capable of storing 125 gigabytes each.



Control Data's Automated Workstation Backup System. For more information, contact your local Control Data sales office, or call **1-800-888-1967, ext. 920.** And let us help you reach new heights in unattended UNIX workstation network file backups.

CONTROL DATA

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to give you control by giving

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It is a truly open initiative

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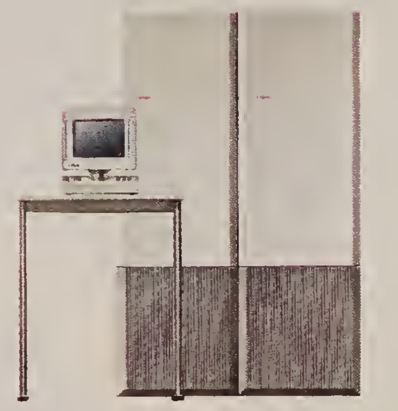
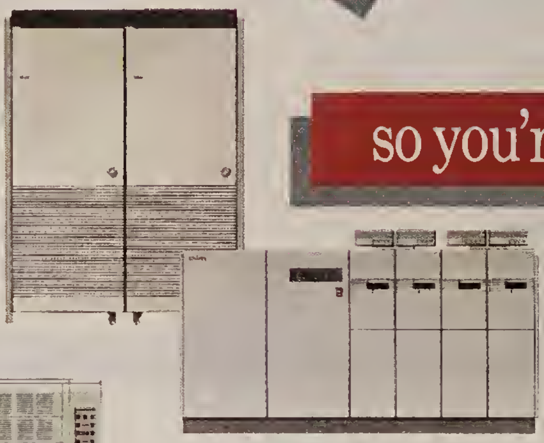
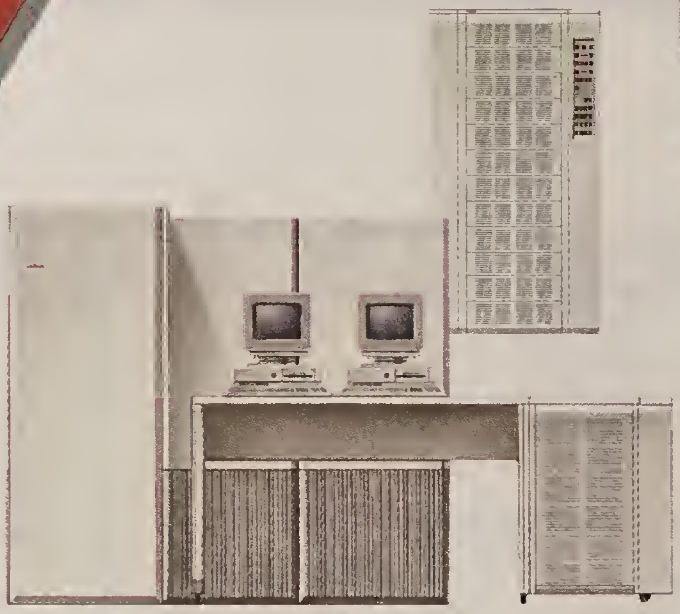
so broad you're free to integrate information

so you're free to integrate Unisys

so flexible you're free to protect past investments







See us at INTEROP, Booth #406

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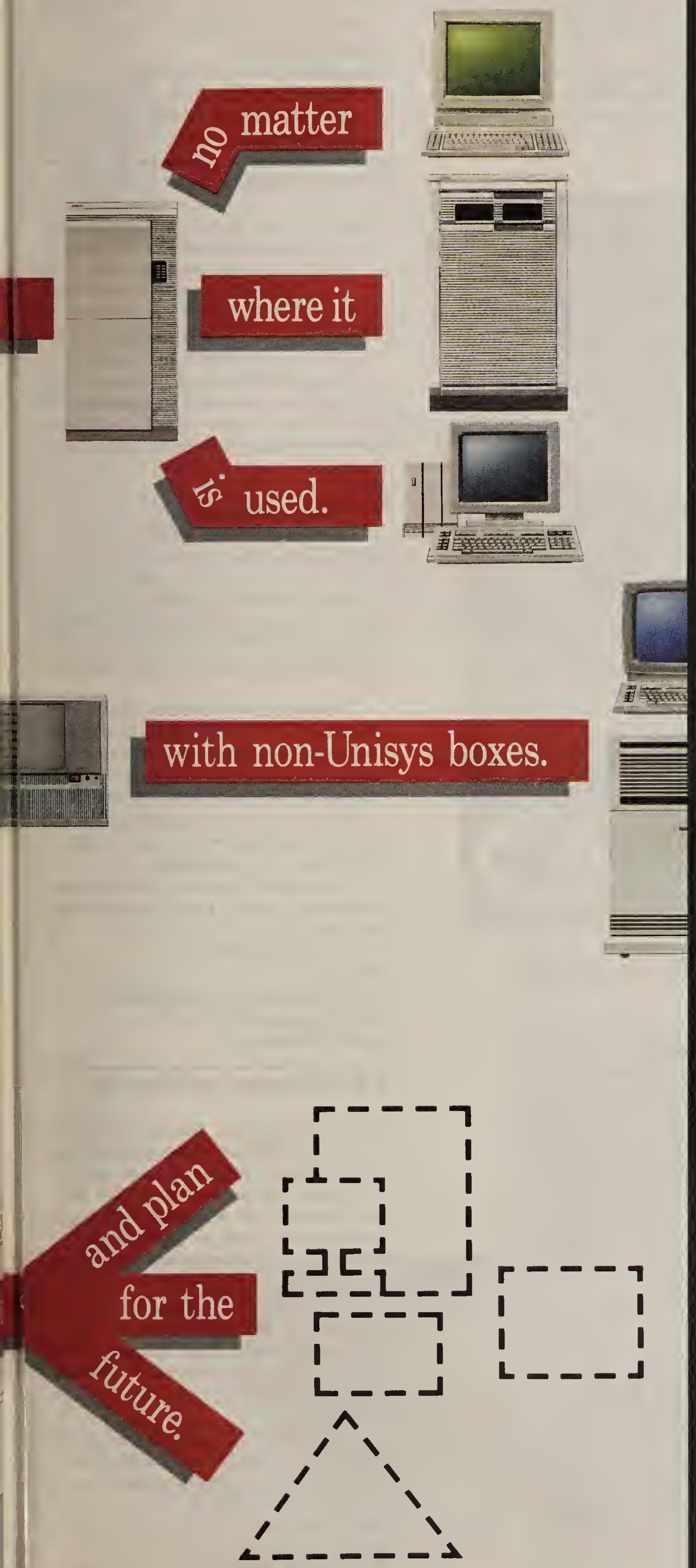

Every enterprise runs better when information runs freely to the people who need it most. That's why you need a computer company that gives you freedom to integrate all the information you work with. And that's why integrated information is the guiding principle of the Unisys Architecture.

Our architecture is designed to give you an open information network that turns isolated information sources into a single resource. It's the first one to take open system standards and apply them across the board to all levels of computing, from workstations to departmental servers and mainframes—and to create an enterprise-wide network.

That means productive interoperability. It means freedom to share network services; share files and data among multiple platforms; move applications between platforms; and benefit from the consistency of applications and training across an open information network.

Many of the systems and software products to start you down this road are here today. Many are yet to come.

Our goal is clear: To give you the greatest freedom of choice in a multi-vendor environment. The freedom to integrate what you have with what you need. The freedom to stay competitive. So call 1-800-448-1424, ext. 48. And see how good freedom can be.

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UNISYS

We make it happen

Merrill & Bryan Enterprises, Inc. has announced an enhanced version of Infospotter, a software program that features memory analysis and a range of diagnostic capabilities for IBM Personal Computer XTs, ATs, Personal System/2s and compatibles.

Infospotter 2.5 can be used to analyze a PC's operating system, memory and devices and then display the data on-screen or send it to a printer for a user to view. Other features include a batch file editor, a programmable option select device library editor and a print-by-menu option.

The product costs $79.95.

Merrill & Bryan
9770 Carroll Center Road
San Diego, Calif. 92126
(619) 689-8611

Bitstream, Inc. and Laser Tools Corp. have announced a font-scaling program for building soft fonts for Hewlett-Packard Co.'s Laserjet printers.

Facelift for Wordperfect is based on the second generation of Bitstream's Speedo technology. The product enables users to generate type in sizes ranging from two to 500 points without exiting from a Wordperfect Corp. Wordperfect application. It also allows more than 360 characters from Bitstream's International Character Set to be accessed.

The program is priced at $99.

Bitstream
Athenaeum House
215 First St.
Cambridge, Mass. 02142
(617) 497-6222

EMS Professional Shareware Libraries has begun shipping the WIN Utility Library, a collection of more than 100 public domain and shareware programs and files designed for users of Microsoft Corp.'s Windows Version 3.0.

The product includes a disk manager, file compression, text processing and other utility programs. It also features a database and search program that permits users to search files by name, type or vendor or perform free-text searches, according to the vendor.

The library costs approximately $50.

EMS Professional Shareware Libraries
4505 Buckhurst Court
Olney, Md. 20832
(301) 924-3594

Bloc Publishing Corp. has announced a memory management utility program designed for IBM Personal Computer XTs, ATs, Personal System/2s and compatibles.

Pop Drop Plus combines two memory management utility programs: Popload, which enables users to load as many as 50 random-access memory-resident programs into expanded memory, and Popdrop, which can be used to load RAM-resident programs into removable layers to facilitate their manipulation.

The product requires 1K byte of RAM and is priced at $99.95.

Bloc Publishing
Executive Tower Penthouse
800 Douglas Entrance
Coral Gables, Fla. 33134
(305) 445-0903

Peripherals

Psion, Inc. has added two bar-code systems to its family of handheld computers.

The Welch Allen Switched Bar Code Scanner ($279.95) and the Dynasys Dynabar-232 Bar Code Reader ($350) were designed for use in various application environments. The Welch Allen scanner is well suited for industrial, office and retail bar-code applications. The Dynabar-232 can be used in data collection environments in which single-hand operation is needed.

Psion
118 Echo Lake Road
Watertown, Conn. 06795
(203) 274-7521

Personal Computer Products, Inc. (PCPI) has announced an enhanced version of its Imagescript cartridge, a product designed for Hewlett-Packard Co.'s Laserjet printers.

The product's port-sharing feature enables users of IBM Personal Computers and Apple Computer, Inc. Macintosh systems to be connected to the same printer via parallel and serial ports. Its input buffer allows data to be transferred to the printer's input buffer at a rate of 10K to 15K bit/sec., the vendor said.

The product requires a Laserjet printer equipped with 1M byte of random-access memory.

It is priced at $299.

PCPI
10865 Rancho Bernardo Road
San Diego, Calif. 92127
(619) 485-8411

PC systems software

Tally Systems Corp. has announced the PC Census Software Recognition Module, which was designed to work with the PC Census Hardware Recognition Module to provide microcomputer and system auditors with a complete inventory of all hardware and software installed in their organizations.

PC Census enables users to automatically identify the brand names and version numbers of more than 250 popular commercial personal computer software packages installed on a hard disk, the vendor said.

The product is priced at $5.50 to $10 per PC. The software and hardware module can also be purchased together for $7 to $10 per PC.

Tally Systems
Buck Road
Hanover, N.H. 03755
(603) 643-1300

Introducing the high speed modems from U.S. Robotics
Now with V.42*bis*

Until now, high speed modem users had the best of one world. They either had speed or compatibility. U.S. Robotics just changed all that.

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With the new line of high speed modems from U.S. Robotics – the Courier HST, the Courier HST Dual Standard and the Courier V.32 – you can now have both the highest speeds and the most compatibility.

For speed – its the Courier HST which delivers throughput up to 35,500 bits per second with MNP® level 1-5 error control and V.42*bis*. And it still costs less than $1,000.

For Compatibility – the Courier V.32 provides CCITT standard modulations from 300 bps to 9600 bps for under $995. And with MNP levels 1-5 and V.42*bis* you will get complete data integrity plus throughputs approaching 24,000 bps.

For the best of all worlds – it's the Courier HST Dual Standard, combining the blinding speed of the Courier HST with the compatibility of the V.32. At $1,295, it costs less than some featureless V.32-only modems.

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For sales in the United Kingdom, please call Miracom, Ltd., Ipswich, England. Telephone: 0473 233888. For Canadian sales, call 1-800-553-3560.

COMMENTARY

Thomas L. Nolle

Networking for 1991

It's traditional to do predictions on the coming year in December. December is still a few weeks away, but there isn't much chance of anything really good happening before then. Maybe we'll all need a little more time for thought and planning this year.

We asked 50 network users what they thought they would be doing and buying. This is the result.

Uncertainty about the economy will be the big factor in 1991. Lack of confidence in the future tends to make business raise target returns on investment (ROI), forcing projects that require capital outlays to pay back before something awful happens. Target ROI in the 45% range will pose a challenge to both users and vendors. Some projects won't make it.

The biggest gains in 1991 will be scored by technologies that can save users money on relatively low investments, particularly those technologies that the users are already familiar with.

Both the equipment and carrier services that support T1 and fractional T1 links are getting cheaper. This will continue to fuel user migration to T1, mak-

Continued on page 80

Frame relay showing its stuff

Though few products exist, private users find it an effective X.25 replacement

BY JOANIE M. WEXLER
CW STAFF

Although frame-relay technology has spawned only a couple of shippable products to date, users and analysts seem to think that it will soon represent much more than lip service.

Unlike Integrated Services Digital Networks, which were prematurely hyped and dependent on service rollouts from the public carriers, frame relay can be implemented in both private and public networks. Efforts toward incorporating the technology in private equipment are leapfrogging those in the public arena.

"I'm excited about frame relay because it appears to be an effective, high-speed replacement for X.25 packet switching," said Phil Evans, director of telecommunications at FMC Corp., a Dallas-based conglomerate.

Frame relay is both an interface and transport service that is faster than X.25 packet switching. It takes advantage of today's highly reliable transport media, such as fiber-optic cabling, by eliminating error-checking and correction at each network node. FMC installed a fiber wide-area network about four years ago.

X.25 for copper

In contrast, the X.25 standard was designed for more error-prone wiring, such as unshielded copper. The X.25 protocol carries overhead required for error checking at each node, which is rarely needed on today's reliable media.

Modular frame-relay interfaces are now shipping for Cisco System, Inc. routers and Stratacom's IPX T1 multiplexers, which primarily benefit users with both vendors' products in their networks. Most T1 vendors said they have intentions to support the emerging frame-relay standard on their multiplexers — including General Datacomm, Inc., FMC's primary T1 vendor — in an announcement last week. However, the majority of vendors, including General Datacomm, have not committed to ship dates.

Codex Corp., however, which has a 20% investment in Stratacom and resells the IPX as its 6290 T1 multiplexer, has gained frame relay by default on its IPX-compatible 6290. It has also said it will support frame relay on both its 6525 X.25 packet switch

Continued on page 76

Campus recasts net for 530M bit/sec. rate

ON SITE

BY ELLIS BOOKER
CW STAFF

PITTSBURGH — Carnegie Mellon University recently performed major surgery on its campuswide network. It did so by replacing the backbone without touching the extremities, and in the process increased the bandwidth on the fiber-optic network from 10M bit/sec. to 530M bit/sec.

To understand how the university achieved this feat, some background is necessary.

Six or seven years ago, Carnegie Mellon started using a star-shaped Ethernet and then moved to a backbone-shaped Ethernet.

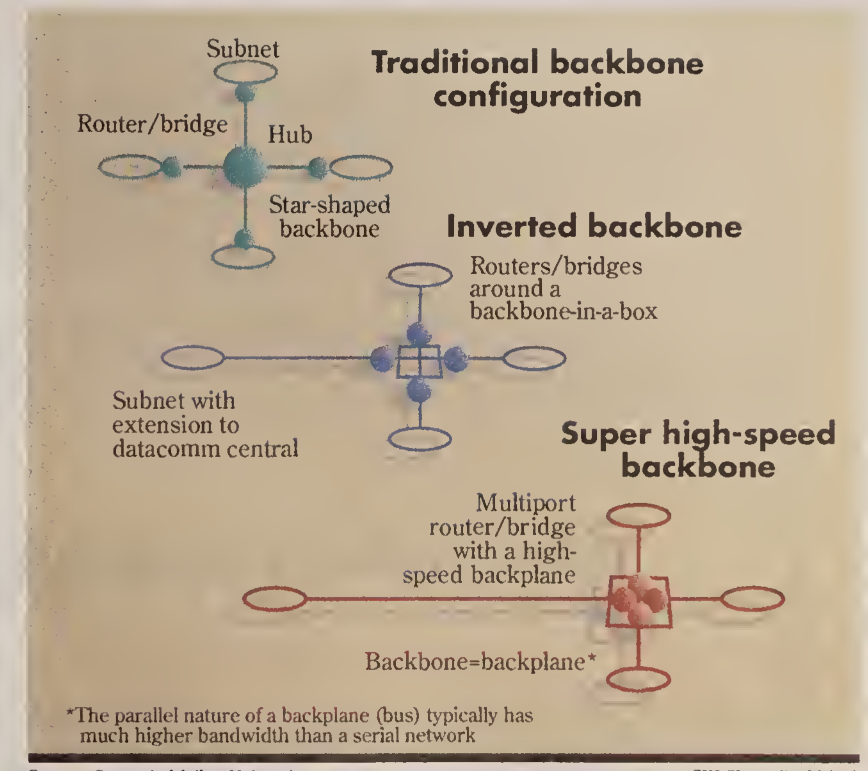
While the backbone's 10M bit/sec. bandwidth fully satisfied the university's data traffic at the time, the new topology caused administrative headaches, because network router technology at the time was more or less nonexistent. "When we had a problem, we constantly had to have technicians go out and fix the problems," explained John Leong, the university's director of networking and communications. "It was very inconvenient."

The solution was found in a

Continued on page 84

Strong backbone

Carnegie Mellon University has migrated from a star topology to an intelligent bus backbone


Traditional backbone configuration
Subnet
Router/bridge
Hub
Star-shaped backbone
Inverted backbone
Routers/bridges around a backbone-in-a-box
Subnet with extension to datacomm central
Super high-speed backbone
Multiport router/bridge with a high-speed backplane
Backbone=backplane*

*The parallel nature of a backplane (bus) typically has much higher bandwidth than a serial network

Source: Carnegie Mellon University

CW Chart: Paul Mock

Announcing the arrival of your favorite MVS text editor on OS/2!

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SPF/2 offers true ISPF/PDF compatibility to the MVS and COBOL programmer.

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MACRO INTERFACE TO REXX

SPF/2 includes 75 ISREDIT commands that interface with IBM's REXX. You may use these to write your own commands in REXX and, if you wish, assign them to the 48 programmable function keys.

Existing mainframe REXX edit macros may be downloaded to run with **SPF/2** and CLIST macros may be easily converted to REXX.

SPF/2 is compatible with OS/2 Standard and Extended Editions, Versions 1.2 or later. However, Standard Edition users will not have access to macro capabilities due to the unavailability of REXX in that environment.

3270 COMPATIBILITY

SPF/2 processes keystrokes in the same manner as the OS/2 Extended Edition 3270 Emulator, including NEW-LINE, ENTER and status display indicators.

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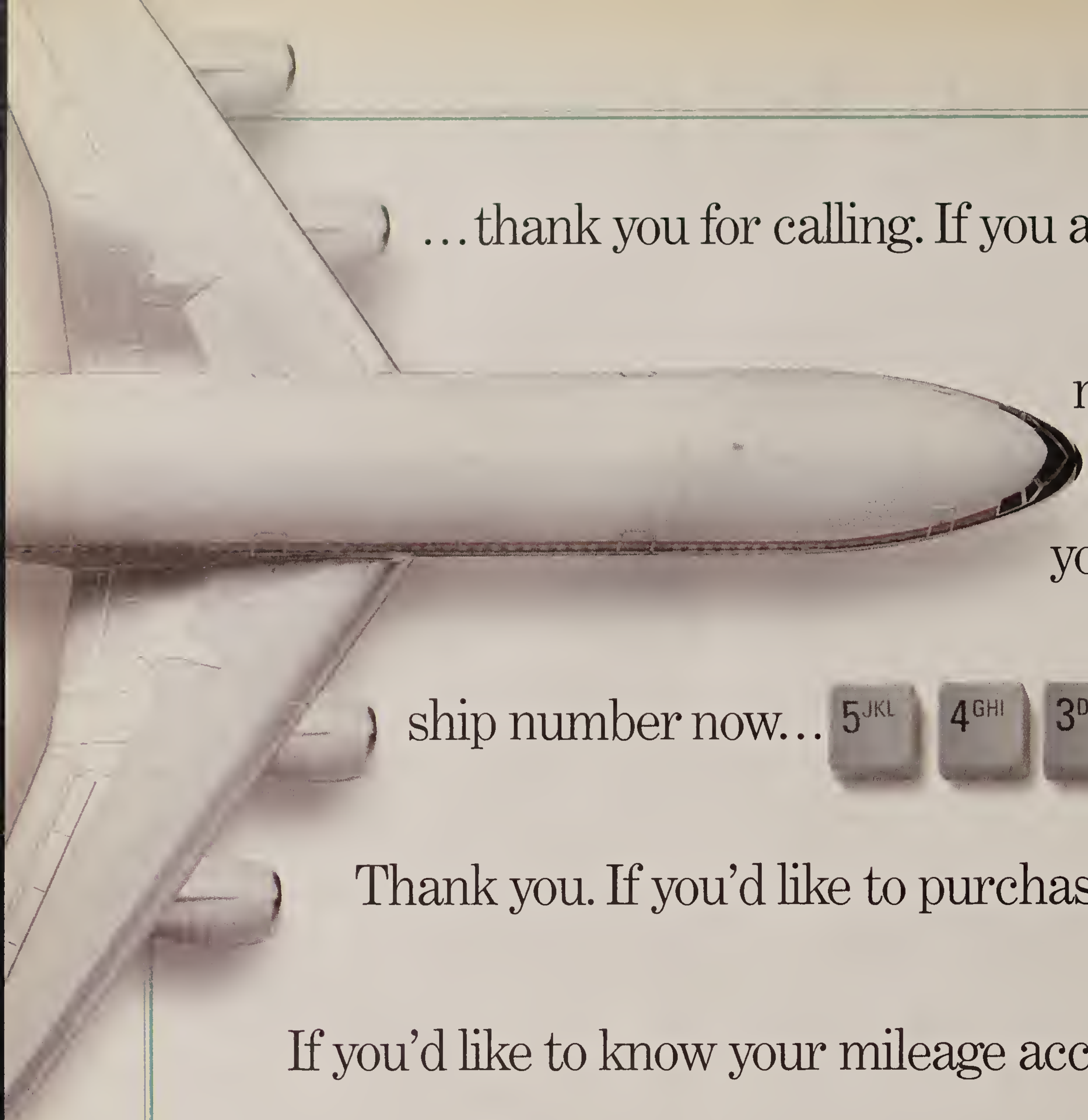

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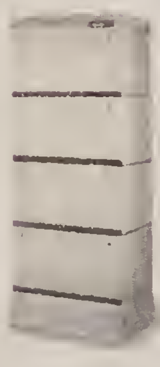

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Communication Systems

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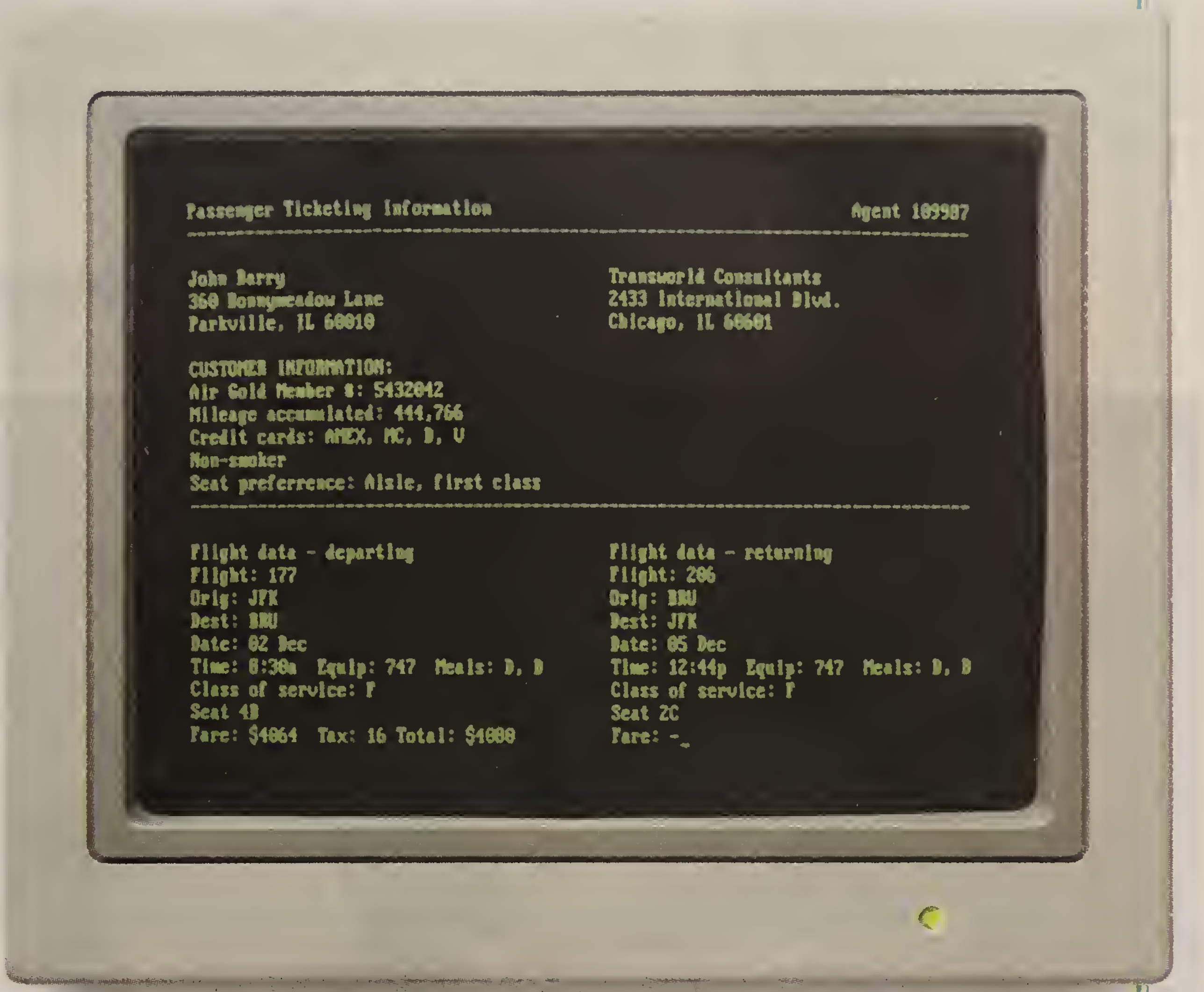
It will be handled by the next available agent in our transcontinental network. An agent will be with you shortly.

In the meantime, you may wish to know your frequent flyer mileage is 444,766 miles. We are now transferring you to an agent…"Hello, Mr. Barry. Brussels on the 2nd? There's a flight available at 8:30 A.M. Fine. I've reserved your favorite seat, 4B. Would you like your special menu?…" nt northern telecom



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Passenger Ticketing Information                              Agent 109987
-------------------------------------------------------------------------
John Barry                              Transworld Consultants
360 Bonnymeadow Lane                    2433 International Blvd.
Parkville, IL 60010                     Chicago, IL 60601

CUSTOMER INFORMATION:
Air Gold Member #: 5432042
Mileage accumulated: 444,766
Credit cards: AMEX, MC, D, V
Non-smoker
Seat preferrence: Aisle, first class
-------------------------------------------------------------------------
Flight data - departing                 Flight data - returning
Flight: 177                             Flight: 206
Orig: JFK                               Orig: BRU
Dest: BRU                               Dest: JFK
Date: 02 Dec                            Date: 05 Dec
Time: 8:30a  Equip: 747  Meals: D, B    Time: 12:44p  Equip: 747  Meals: D, B
Class of service: F                     Class of service: F
Seat 4B                                 Seat 2C
Fare: $4064  Tax: 16 Total: $4080       Fare: -_
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TECHNOLOGY THE WORLD CALLS ON

Global players winning with EDI technology

BY ELISABETH HORWITT
CW STAFF

NEW YORK — Information systems applications such as electronic data interchange (EDI) have played a key role in U.S. manufacturers' positioning of themselves as global competitors, according to a joint report published recently by Coopers & Lybrand and Louis Harris.

Based on a survey of 150 large manufacturing firms, 60% of which said they were emphasizing product globalization, the report points to the need "to put plants where the major overseas markets are and then build in flexibility through just-in-time and EDI so that they can respond quickly to market signals," said Grady Means, Coopers & Lybrand's chief economist. "That's the winning strategy for the next decade."

Just-in-time techniques enable plants to handle short product cycles rather than large batch jobs. "EDI is geared to control information from point of sale to the supplier and plant, then to the customer."

Such techniques build flexibility into the system "so that as market conditions change, you can change faster than the competition," Means said. "Forecasting accurately is hard, but if your system can respond to new trends and changes quickly" without loss of plant resources and materials "and without your having a lot of inventory to get rid of, you win," he added. "The trick is to do it globally," matching market demand with available production capacity and inventory, regardless of national boundaries.

A number of U.S. companies are already using such techniques to improve their global competitive stance. Since the spring of last year, for example, Mattel, Inc. has been working toward more interactive links between its U.S. data center and overseas plants, affiliates and distribution centers so that the toy maker can more effectively match changing market demand to existing plant and warehouse capacity. Links between manufacturing plants in Europe and the Far East allow Mattel to meet increased demand in one country using excess inventory from another.

Benetton Group S.p.A., an Italy-based garment manufacturer with broad U.S. distribution, broke ground in its industry several years ago by developing a networking application to track product movement at its outlets on a daily basis, according to a global networking report released last summer by KPMG Peat Marwick and its Nolan Norton & Co. unit.

Indeed, Coopers & Lybrand found many positive signs that U.S. firms such as Procter & Gamble Co. and Philip Morris, Inc. were "moving just right in framing global strategies to meet global market conditions," Means said. "A lot of economists were surprised" at the U.S. Department of Commerce's recent announcement that the U.S. annual growth rate reached 1.8% this quarter, he added. "They don't understand the new strategic moves corporations are making; they won't have a lot of inventory to move in the next two quarters, and they have become a lot more flexible and responsive."

The positive trend toward more flexible, global manufacturing is expected to accelerate "as companies get better at creating logistic systems that can support faster movement of smaller lot sizes around the world," Means said.

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Token-ring net monitors on tap

BY JIM NASH
CW STAFF

MENLO PARK, Calif. — Network General Corp. recently expanded its network monitoring and analyzing product line by adding token-ring monitoring capabilities.

Network General announced that monitoring software for 4M and 16M bit/sec. token-ring will be shipped as a free upgrade next month for both the Sniffer analyzer and Watchdog monitor.

Competitor Novell, Inc.'s Lanalyzer works only on 4M bit/sec. token-rings, and Lantern, Novell's monitor, does not work with token-ring. IBM devices analyze both 4M and 16M bit/sec. systems.

At Blockbuster Entertainment Corp. in Dallas, Rick King said he has performed beta tests on the token-ring Watchdog. King, manager of corporate networks, said he was able to learn how to use the Watchdog in about a week. After about five months, he is still learning how to use the more complicated Sniffer, he said.

Before the testing, King said, he was unable to monitor his 4M bit/sec. token-ring networks. Watchdog allows him to spot "soft errors," or those traffic activities hitting preset limits, he explained.

Jay Weil, director of marketing at Network General, said administrators can use the company's tools to reconfigure networks and bridges as well as redistribute files to decrease internetwork traffic. He admitted, however, that the company has yet to break from its standard character-based interface.

Weil also acknowledged that Network General's products lack the remote alarm feature recently promised by Novell for Lantern.

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X terminal users: Don't hesitate to evaluate

BY JOANIE M. WEXLER
CW STAFF

NEW YORK — Just because a company has boiled down its myriad Unix networking options to X terminals does not mean it can relax. The X terminal market is glutted with suppliers, models and price ranges that users must evaluate.

This scenario became further muddied on the Unix Expo floor two weeks ago. NCR Corp. announced that it has bundled the Open Software Foundation's Motif graphical interface window manager into its display stations. By running OSF/Motif locally — rather than on a host — the stations do not have to continually communicate with the host to use OSF/Motif.

"This is clearly an advantage, because it reduces network traffic," commented Stephen Auditore, president of The X Business Group, a research and consulting firm in Fremont, Calif.

Network Computing Devices, Inc. (NCD) broadened its already extensive X display line with a $1,495, 15-in. monochrome terminal slated to ship this month. The NCD15B offers screen resolution of 1,024 by 800 pixels and is based on the Motorola, Inc. 68000 chip.

X terminals are diskless, somewhat intelligent stations that capitalize on the X Window System protocol developed at MIT. X Window System allows terminal users to access multiple hosts across a network and simultaneously display applications and files in various windows on one screen. X terminals, which offer the high-resolution benefits of a workstation, compete with personal computers and workstations — diskless or otherwise.

While the terminals give up the local application and file processing ability of personal computers and workstations, they are generally considered less expensive than the other two options and can relieve data management headaches for companies wishing to keep their computing centralized.

Auditore said that X Business Group's research shows that the main criteria users are employing to sort through today's broad X terminal offerings are company reliability, stability and experience.

Stephen Beck, a member of the technical staff at Princeton University, which has 68 NCD terminals installed, said, "There's no magic in making a selection; you basically use the same criteria as you would in choosing a workstation. A big part of that is the way you feel about the people behind the sales."

More than 25 vendors offer X terminals today, including many major computer manufacturers, and Auditore acknowledged that this is too many for the market to ultimately sustain.

EDI could save defense dollars

BY GARY H. ANTHES
CW STAFF

BETHESDA, Md. — A study by the Logistics Management Institute (LMI) says the U.S. Department of Defense (DOD) could save $1.2 billion over a 10-year period by investing just $79 million in document processing automation, a payback of 15-to-one.

LMI chose 16 high-volume documents — used by the DOD in procurement and contract administration, transportation, supply, maintenance and fuels — and computed the direct and indirect savings from converting paper processing to electronic data interchange (EDI).

LMI, a federally funded research and development center, said the results are conservative. It said it computed an average savings per document of $2.40, compared with savings of $10 to $50 per document routinely claimed by the private sector. LMI also figured that every dollar of direct cost savings would be matched by $1.80 from reduced inventories, streamlined operations, reduced interest expenses and other indirect costs. It said the private sector looks for indirect benefits three to five times the direct benefits.

But where the cost savings per document may be relatively low, the DOD makes it up in volume. The basic order form for supplies tops the list of 2,100 documents that are candidates for EDI, flowing at the rate of 11 million annually.

Direct and indirect savings over a 10-year period from automating the 16 forms would total $1.2 billion, rising to an annual total of $213 million in the 10th year, LMI said. To get that, LMI said, the DOD would need to make a onetime investment in computer hardware, software, telecommunications and procedures of about $79 million, spread over 11 years.

Thomas P. Hardcastle, a research fellow at LMI, said most of the EDI initiatives at the DOD so far have been relatively small but the agency is gearing up for a big push in electronic commerce. The first phase will take place at the Defense Logistics Agency's Finance Center in Columbus, Ohio, where annual procurement is approaching $100 billion.

Hardcastle said EDI is at the heart of the giant automation effort. but related tools, such as electronic mail, electronic bulletin boards and electronic funds transfer are important, too.

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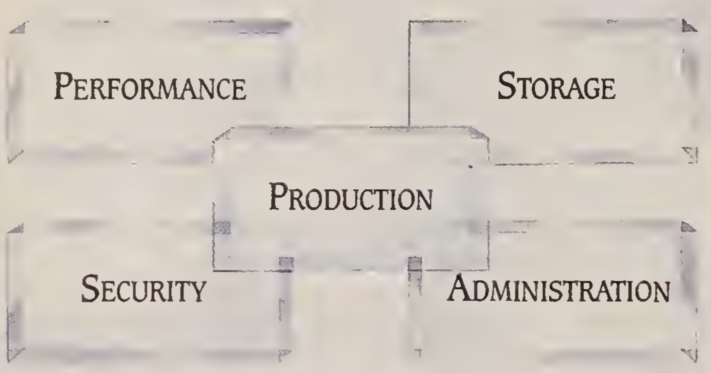

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Frame relay

CONTINUED FROM PAGE 67

and a new product — the 6507 multiprotocol packet assembler/disassembler — during the first quarter of 1991. The frame-relay product line will reportedly be manageable by Codex's 9800 network management system.

Rosemary Cochran, a principal at Vertical Systems Group, a consulting and research firm in Dedham, Mass., pointed out that "what Codex hasn't mentioned is the LAN internetworking issue. Codex offers a bridge, and I assume it intends to add frame relay to it. But that has not been part of the announcement."

To make use of a frame-relay network, interfaces are needed on both the access side — such as a bridge or router — and on the wide-area side, such as a T1 multiplexer.

"Unless you have both types of products, there's nothing that can be accomplished," Cochran said. Steven A. Taylor, president of Distributed Networking Associates, a consultancy in Greensboro, N.C., concurred: "Frame relay will be tough to implement on a trial basis. Users will have to evaluate it, then go into it heavy-duty."

Time out

Gary Ragsdale, assistant vice president and chief engineer at Fedex International Transmission Corp. (ITC), a division of Federal Express Corp. in Memphis, predicted that the industry will have "to wait a year before it sees a lot of products in the field."

Fedex ITC is looking forward to frame-relay capabilities on the Netrix Corp. •1-ISS, which will support a mix of frame-relay, T1 multiplexing and X.25 packet-switching capabilities. The •1-ISS technology will also be blended into Infotron Corp.'s SL25 T1 multiplexer during the first quarter of 1991, according to Infotron.

"Our applications are becoming more distributed," Ragsdale explained. "We acquired the Netrix product for packet switching but also because we were looking ahead to frame relay for very high-speed LAN interconnections." Ragsdale added that slow response times for sending inter-LAN traffic "are already a big problem" at his company.

Formation, Inc., in Moorestown, N.J., may have stumbled on a solution to the piecemeal frame-relay concern. When responding to a federal bid for a communications interface, the firm developed a product that it said maps to frame relay, as well as to the emerging Switched Multimegabit Data Service and metropolitan-area network standards. Vendors and users incorporating the Formation interface into their equipment could theoretically have interoperable products supporting all these services.

"Our multimegabit interface is almost universally adaptable and can attach to public networks," said Roger Wyer, Formation's director of marketing.

Cochran and Taylor agreed that one loophole in frame-relay technology is lack of accommodation of IBM equipment. IBM speaks Systems Network Architecture protocols, which are packetized but not frame relay-compatible.

"It's not an inexpensive technology," Taylor noted. "We're talking $50,000 to $200,000 per node, not a couple of $2,000 boxes. But it's a new technology that allows the entire world to perform as if it were on a LAN."

Defining options

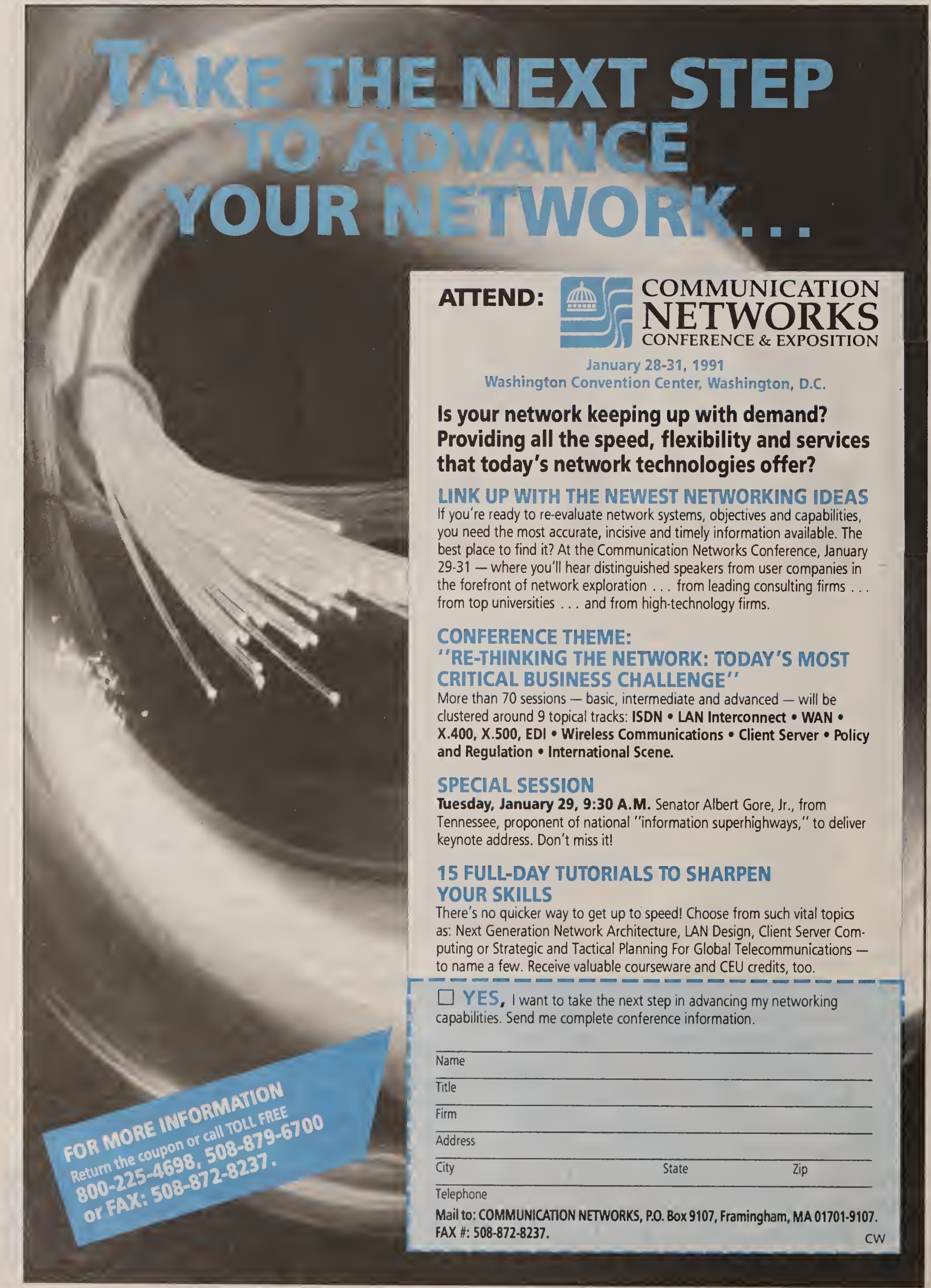
The terms frame relay, cell relay and fast packet have about as many definitions circulating as Ben Franklin had children. Generally speaking, however, frame relay and its sister technology, cell relay, fall under the "fast packet" technology umbrella. Both are intended to improve on traditional packet switching by speeding up packetized transmissions.

Vertical Systems Group, a research and consulting firm in Dedham, Mass., defines fast-packet switching as "an architecture that supports both voice and data at T1 speeds [1.544M bit/sec.] and above and switches at least 50,000 packets per second. Unlike X.25 technology, it provides no error detection in retransmission."

Frame relay transmits data packets of variable lengths, in contrast to cell relay, which accommodates fixed-length packets of 53 bytes. This fixed-packet nature makes cell relay more suited to voice transmissions than frame relay, because voice is less tolerant of reassembly delays at the receiving node caused by the variable length of the frame-relay packets.

Cell relay is being pursued aggressively by public carriers — which have traditionally made voice their business — while frame relay is initially invading private networking equipment. The cell-relay standard specifies higher speeds — 45M bit/sec. and above — because its designated packet-length nature requires less processing.

JOANIE M. WEXLER



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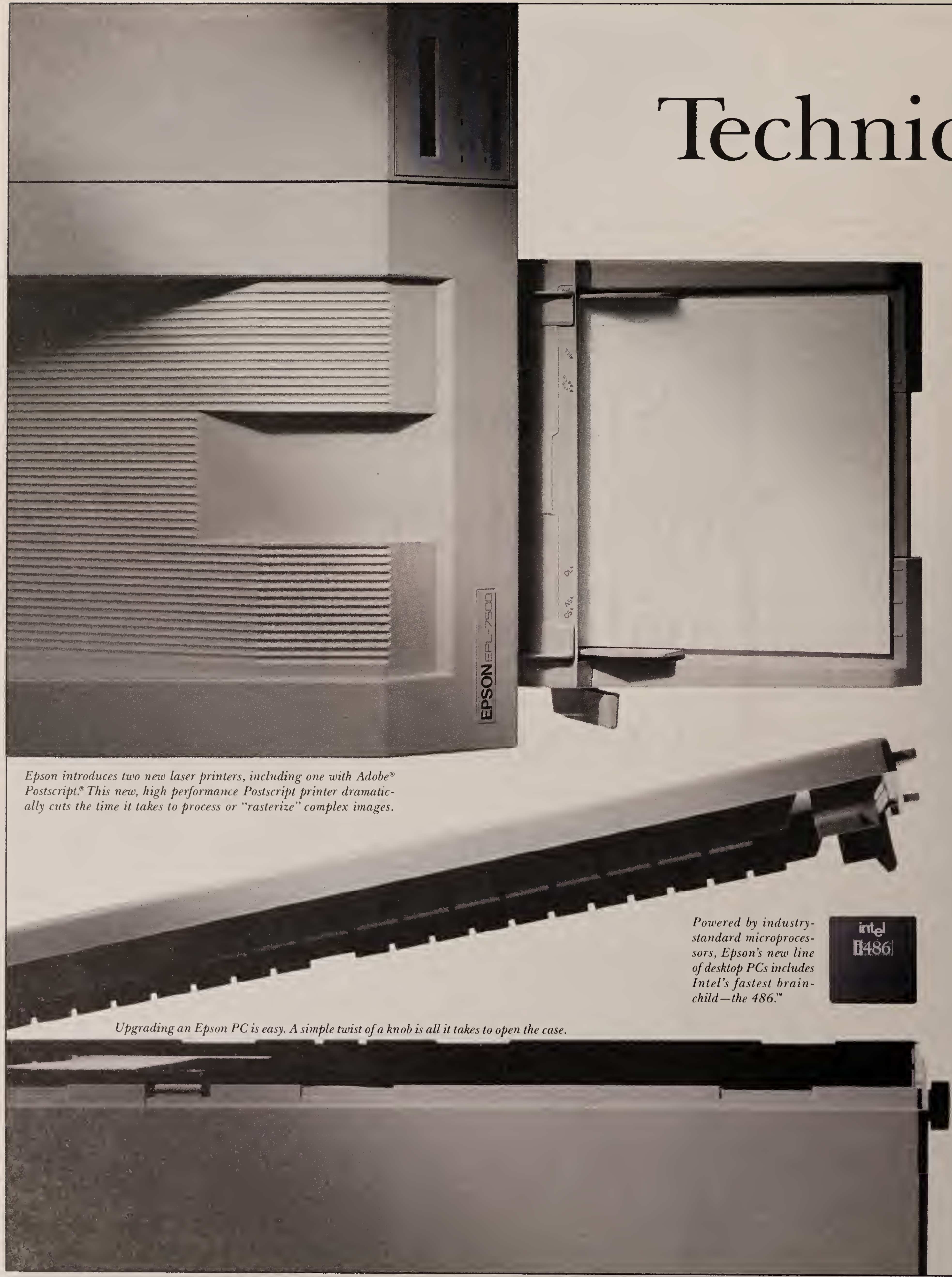

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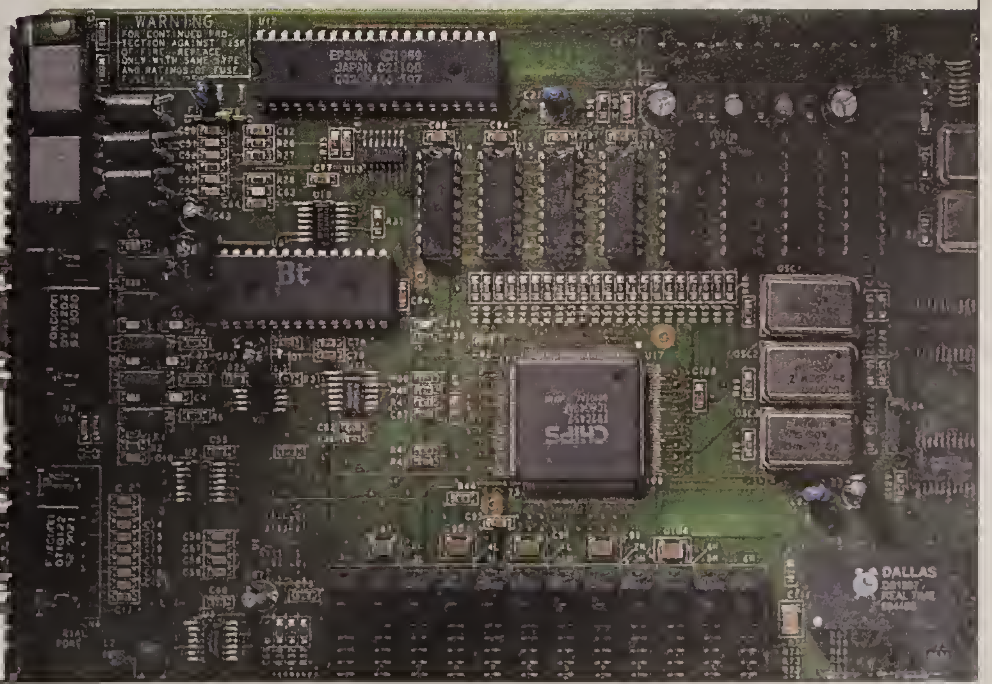

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Nolle

FROM PAGE 67

ing it likely that 1991 sales will probably outpace this year's sales both in services and equipment.

The vendors who bet on T3 may find redemption in 1991 as well, according to larger network users. Rates are stabilizing and falling, and customer premises equipment is also getting cheaper. Initial cost will still scare away some users, but more T3 should be sold than in 1990, possibly 60% more.

Virtual network services will gain popularity, inside and outside of special Tariff 12-type arrangements. Virtual networks can provide many of the benefits of private networking at lower cost because the carriers provide the nodal facilities. Some users will find that expansion of private networks through a conversion to virtual services will provide better savings at little or no additional hardware cost.

Local-area network linkage is also a hot application for 1991, but users say they expect most of the dollars to go into traditional technologies like fractional T1 and X.25, not into new ones such as frame relay. It will be cheaper at first to use 64K bit/sec. circuits on existing private networks to link LANs, or to support basic message and file transfer services between LANs through packet networks.

Probably the hardest hit technologies in 1991 will be those that are both new to the user and require a substantial capital investment. The latter will make the financial officer resist unless something really credible can be put together.

Fiber Distributed Data Interface (FDDI) probably won't gain much ground in 1991, despite the popularity of LANs and LAN interconnection. Cost per attachment for FDDI is still high, and users perceive a sharp drop during the next two years. This, according to our research, tends to string out the buying cycle. The applications that do best will be those that create FDDI backbones to facilitate wide-area linkage of LANs.

Another technology that could be affected by high investment is frame relay. Where the technology can be retrofitted to existing equipment at a low marginal cost, frame relay can participate in the overall increase in LAN interconnection. But business still hasn't come to terms with the benefits of the new technology, and most frame-relay opportunities will fall toward year's end.

Open Systems Interconnect (OSI) is a third loser, according to users. It is difficult to adapt existing applications to OSI, because it tends to have a different set of application programming interfaces than other communications architectures already in use. The incremental cost of those first few OSI lines still tends to be higher than users expected, and this higher entry threshold discourages experimentation.

Then there's Integrated Services Digital Network (ISDN). Like OSI, ISDN requires some changes in applications to employ effectively on a large scale. But ISDN does not share the positive user attitude that OSI enjoys. Most users say they believe OSI is necessary and valuable; fewer than half believed that of ISDN. Users also have an interesting cross-polarization with carriers on ISDN. Users want to apply ISDN to applications that save money, and carriers think they are going to *make* money on these same applications.

All of this doesn't mean users have lost faith in technology. Business makes it clear they're not forever closed to those technologies they believe are less likely to be financed in 1991. In fact, the technical area that received the second-greatest expression of strategic commitment was OSI, and that which received the third was integrated network management, an area that fell into "neutral territory" in financial commitment. But to business, the problem is obvious — we've got to live within our means next year. A scary thought, but somehow refreshing.

Nolle is president of CIMI Corp., a communications consulting company based in Voorhees, N.J.

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Campus

CONTINUED FROM PAGE 67

so-called inverted backbone, whereby the routers were located centrally but attached to the remote subnets in a loop.

"From a maintenance standpoint, technicians no longer had to travel to the remote subnets to service the routers," said Leong, adding that the 10M bit/sec. inverted backbone was used for four or five years.

Inevitably, however, Carnegie Mellon's bandwidth requirements began to grow; network utilization, thanks in part to a greater amount of distributed processing, began to grow 20% a year. "A year or two ago, the [utilization] on the backbone was 40% to 50%," Leong said. "That's when you start getting a little nervous."

Leong and his team looked at solutions including Fiber Distributed Data Interface (FDDI) 100M bit/sec. networking but decided that their existing network topology looked like "a backbone in a box, like a bunch of Ethernet cards connected into a backplane."

Backplane devices use a parallel bus and therefore are very fast. However, those backplane devices on the market at the time required more maintenance than Carnegie Mellon was able to justify.

Finally, a solution

After six months of looking, Leong stumbled onto a product from Cisco Systems, Inc. The AGS Plus router was being marketed as a standard multiport bridge or router, not as a backbone, but Leong saw how he could use the product for his application.

The first AGS Plus was installed in August — and a second will be deployed for backup purposes shortly.

Ordinarily, if four subnets enter an Ethernet box, each cannot run at 10M bit/sec. because the box itself is capable of only 10M bit/sec. However, if each network comes into an interface card, which is on a 530M bit/sec. bus, then the bus distributes the bandwidth.

Carnegie Mellon has 60 local-area networks connected to 30 bridges in the central data communications center; all the routers are in turn connected to the Cisco box.

The Cisco router can accommodate 24 Ethernet interfaces through the unit's four card slots. Each interface card can support a single FDDI interface or six Ethernet interfaces. Currently, Carnegie Mellon has three Ethernet cards running, and an FDDI interface card arrived from Cisco.

Leong, however, has not forgotten the management issues that compelled him to move to an inverted backbone network several years ago.

"This [Cisco box] is perfect for management," he said. "It uses uses a very powerful [Simple Network Management Protocol]-based sofware." He noted that the university has used SNMP for some time.

If there is a complaint or a downside to the backplane approach, according to Leong, it is its single point of failure. Indeed, in the second phase of the project, Carnegie Mellon will acquire a second router to act as a redundant facility should the first one fail. He plans to use Ultranet's to the two Cisco boxes. Ultranet will offer gigabit speeds between the two routers.

AT&T jumps into 486 arena

BY ELLIS BOOKER
CW STAFF

MORRISTOWN, N.J. — AT&T announced a new communications server last week and discreetly tossed its hat into the uniprocessor I486 marketplace.

AT&T already had a server using the Intel Corp. high-end processor, but its symmetric multiprocessor Starserver E can take one to four 33-MHz I486 boards.

In addition to the server introduction, AT&T enhanced its IBM connectivity tools for its Stargroup LAN Manager Server networks, adding a Systems Network Architecture (SNA) gateway that allows MS-DOS workstations in a Stargroup LAN to emulate IBM 3270 terminals and printers and connect to SNA mainframes. Among other improvements, the latest version of AT&T's Host Connectivity Software now supports AT&T's Unix System V Release 4.0, the latest version of the operating system.

The new server, the Starserver S, is a uniprocessor I486 machine with an Extended Industry Standard Architecture bus, a clock speed of 33 MHz and a 26.5 million instructions per second rating. AT&T's latest server also features a small computer systems interface.

"They need the additional performance [of a 486]," said analyst John C. McCarthy at Forrester Research, Inc. in Cambridge, Mass. McCarthy noted that because AT&T's servers run a version of Microsoft Corp.'s LAN Manager as an application on top of Unix, they require more processor overhead than servers from Novell, Inc. or 3Com Corp.

The Starserver S joins AT&T servers based on the 80386 and reduced instruction set computing platforms. Like the other Starservers, the S model can be used as a server, a multiuser system or as both simultaneously. It can support as many 64 clients as a server, 32 to 80 users as a multiuser system or 32 clients and 48 asynchronous users as a combination host. The Starserver S will range in price from $14,995 to $24,395.

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NEW PRODUCTS

Local-area networking hardware

Net-Source, Inc. has announced an Arcnet entry-level local-area network that is based on Server Message Block (SMB) technology.

Silvernet features two Arcnet adapters that have been certified as compatible with Novell, Inc.'s Netware and IBM's Netbios; the Silvernet-OS SMB protocol network operating system, which requires less than 40K bytes of memory; Silvernet Control Center software; and all necessary cables and manuals for a two-user LAN.

The product's average price is $204 per node for nine users.

Net-Source
120 Saratoga Ave.
Santa Clara, Calif. 95051
(408) 246-6679

The Multi-Media Hub and Dual-Raven were recently announced by Kodiak Technology. Both were designed to provide users of Novell, Inc. Netware-based Ethernet networks with configuration and cabling flexibility, according to the vendor.

The Multi-Media Hub ($699) is a single board that serves as an Ethernet adapter, a repeater and a media converter. It can be used to connect coaxial local-area networks to 10Base-T networks.

The Dual-Raven ($649) provides the equivalent of two independent Ethernet channels on one IBM Personal Computer AT-compatible board.

Kodiak Technology
1338 Ridder Park Drive
San Jose, Calif. 95131
(408) 441-6900

Local-area networking software

Hayes Microcomputer Products, Inc. has announced an asynchronous communications software program designed for use in stand-alone or networked personal computers.

Smartcom Exec Version 2.0 allows single or multiple modems to be shared on asynchronous communications servers. It also includes a text editor equipped with word processing capabilities.

The product costs $129 and is scheduled to be available in mid-January. Current owners of Smartcom Exec Version 1.0 can upgrade their systems for free until March 31, 1991.

Hayes Microcomputer Products
P.O. Box 105203
Atlanta, Ga. 30348
(404) 449-8791

US Sage, Inc. has announced an Ethernet-based peer-to-peer network system that enables users of connected personal computers to transmit data at 10M bit/sec.

Mainlan Ethernet requires 30K bytes of random-access memory in conventional PC workstations or 15K bytes of RAM in Lotus/Intel/Microsoft Expanded Memory Specification-based workstations.

The system is compatible with Novell, Inc.'s Netware and IBM's Netbios. It is priced at $499 for a starter pack that connects two PCs. Additional packs cost $199 apiece.

US Sage
2005 Tree Fork Lane
Longwood, Fla. 32750
(407) 331-4400

Gateways, bridges, routers

Network Systems Corp. has announced a router designed to enable users to connect pairs of Fiber Distributed Data Interface rings to each other.

The FE649 supports the Transmission Control Protocol/Internet Protocol and Digital Equipment Corp. Decnet routing protocols.

The product is priced at $54,000.

Network Systems
7600 Boone Ave. North
Minneapolis, Minn. 55428
(612) 424-4888

BICC Data Networks, Inc. has announced Isolan Etherconnect System/4 (ECS/4), part of a range of managed Ethernet systems designed for use in structured wiring multimedia environments.

The ECS/4 is a multimedia intelligent hub designed for small local-area networks. It supports up to four line cards and provides local management functionality without a dedicated microcomputer and remote management capabilities.

The product is priced at $1,595 for just an enclosure.

BICC Data Networks
1800 W. Park Drive
Westboro, Mass. 01581
(508) 898-2422

Retix Corp. has announced an Ethernet bridge that provides filtering rates of 29,000 packet/sec. and forwarding rates of 13,650 packet/sec. while running the IEEE 802.1 Spanning Tree Protocol.

The 4660 Local Bridge incorporates autolearning, transparency and advanced networking features. It supports plug-in modular interfaces designed for standard 802.3/Ethernet, thin Ethernet and 10Base-T media. It is priced at $3,750.

Retix
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Santa Monica, Calif. 90405
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MANAGER'S JOURNAL

EXECUTIVE TRACK

Jan M. Connolly has been promoted to the new position of assistant vice president of corporate operations at **Ameritas Financial Services** in Lincoln, Neb.

She is responsible for the development and maintenance of Ameritas' long-term strategic direction and reports to the company's president and chief executive officer.

A 16-year Ameritas employee, Connolly was most recently director of marketing systems. She is a graduate of the University of Nebraska at Lincoln, chairman of the Association for Systems Management's Division 17 and member of the *Journal of Systems Management* editorial review board.

……

Larry Wester, formerly director of computing and information systems at East Carolina University, has been named a partner at **Pace, Wester and Associates** in Savannah, Ga. The firm specializes in banking, information management and general business advisory services.

……

Glenn Larson, chief information officer at **First National Bank of Chicago**, was elected to the board of directors of the Electronic Funds Transfer Association in Alexandria, Va.

Larson currently manages systems and operations within First Chicago's community banking group. Before joining the bank in 1983, Larson was vice president in charge of West Coast operations at Visa USA.

……

Who's on the go?

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The art of managing programmers

Managers must balance egos, eccentrics and a desire for freedom

BY PATRICIA KEEFE
CW STAFF

Jessie Hartland

Good programming is considered an art, so practitioners are often compared to artists and musicians. Often unconventional or egocentric, these "creative types" pose unique challenges to another art — that of managing them.

Good programmers are hard to find and hard to keep. If thrust into a corporate straightjacket, some, like Vadim Yasinovsky, now president of Clear Software, Inc. in Brookline, Mass., may flee to smaller, more entrepreneurial organizations. But if allowed to thrive on the image and mystique of the eccentric and all-knowing software guru, programmers can lose sight of the real reason behind their creative endeavors — solving problems for users.

"I think there's been some amount of programmers not being managed," says June Rokoff, the senior vice president at Lotus Development Corp. who is widely credited with taking over the troubled 1-2-3 Release 3.0 project and getting the product to market last year.

"What tends to happen in those cases is that they are taught to believe eccentricities are good, that 'You are bright and creative, and we don't want to impede that.' I think that is a management flaw," she says.

On the other hand, applications development tends to require more ambiguity about how to achieve the mission, observes Doug Underhill, assistant vice president for technical services at CSX Technologies, Inc. in Jacksonville, Fla. Programmers, he explains, are often doing things that are new: designing new systems or trying to resolve first-time problems. In these situations, he suggests, operating with a rigid plan or specific dates may get in the way of productivity.

The trick then lies in striking a balance between nurturing the creative spirit while keeping the programmer grounded in the reality of day-to-day business needs. But too often, programmers are left to wander off into some corner, isolated from the rest of the company. The key to breaking this pattern is constant communication, managers say.

There are many opinions as to the best way to achieve this, but few will quibble with the proposition that programmers, and the way they work, *are* different.

"People program because they love the intellectual challenge," says Price Waterhouse technology director Sheldon Laube. As such, they are motivated by "tremendous technical challenges," along with the freedom to explore possible solutions, maintains the former head of the New York-based audit and consulting firm's advanced technology group.

Programmers "want rational, logical explanations in a democratic fashion," Rokoff adds. "If you order them, they'll do it, but unless they understand it and get their hearts and minds behind it, you won't get their creative juices." To get that, she says, management must be more demanding — but

Continued on page 88

Trying to bridge the Asian language gap

BY CLINTON WILDER
CW STAFF

Doing business with the Pacific Rim? There are few hurdles greater than trying to enter, process and transmit text written in the complex character-based languages of the Orient. But a growing number of people believe that technology can come to the rescue — if the will exists.

A weekend-long symposium last month at the University of Pennsylvania brought together 150 attendees from business, government and academia to discuss the issue and view some of the latest relevant technologies, such as conversion programs. The Philadelphia conference concluded that the language barriers will remain formidable as long as nationalist and traditionalist attitudes persist.

"The reality right now is that no one wants to talk about it," said conference organizer Victor Mair, a professor of Chinese literature at the university. "Most business applications simply use English."

Masaaki Ogai

Earlier this year, a group of computer vendors formed the Unicode Consortium to promote a standardized way of coding Japanese, Chinese and Korean characters. The consortium includes Xerox Corp., Apple Computer, Inc., Sun Microsystems, Inc., Microsoft Corp., Hewlett-Packard Co., Next, Inc. and IBM.

"If you're going to have networks back and forth among countries, you have to have standard codes back and forth," Mair said.

The inputting problem is particularly acute in mainland China, where some fear that the time-consuming task could be a major hindrance to the developing economy. Apollo Wu, a United Nations translator, told the conference that Chinese documents are 2½ times more expensive to process at the United Nations than any other language. In Taiwan, the growing computer industry is virtually 100% English-based.

"They go where the market is," Mair said. "[Computer vendors] say they just can't make machines that work for Chinese. But you can't avoid language problems."

Programmers

CONTINUED FROM PAGE 87

in a positive way.

Providing the best toys and technology enables programmers to work at the edge, Laube says, citing the development atmosphere in the early years at Data General Corp., which was detailed in Tracy Kidder's *The Soul of a New Machine*. "It was true then, and it's true today," he says. "Money is not enough if [these people] are bored."

It's also not enough if the programmer feels slighted. Chris Mitchell, a systems manager at RFC Intermediaries, a reinsurance brokerage in Atlanta, points out that because programming is a creative process, people tend to be more possessive of their work. "So if you try and take a project away or reassign it, it's [seen as] an insult. Programmers take their work very personally," he says.

John Martini

Price's Laube: *Money is not enough*

Programmers are often afforded a more flexible work environment than their fellow employees, and this can cause resentment, Mitchell adds. He said other departments often do not understand that his staff is on call 24 hours per day and may be leaving early because they spent the previous night coding. Closer relationships between the information systems staff and its clients can help resolve this.

Yasinovsky maintains that programmers need that greater degree of freedom. It's important for them to have enough free time to attend trade shows, read industry publications and play around with software, he says. He says he believes they need to be able to look around and explore different ideas.

Still, things can get out of hand, which can delay application delivery. Developers are often so caught up in what they are doing that they don't know when to stop and ship the final product. When that happens, Yasinovsky sits down with his team and spells out the reality of business life.

"I explain that yes, we can put 50,000 things into the product, but here is our financial situation," he says. "I let them suggest what sacrifices to make."

Sometimes it can be hard to create a sense of responsibility. If necessary, Yasinovsky will resort to guidelines and dates, but he prefers to avoid that route if possible.

All workers need recognition, but it seems especially true for programmers, managers agree. There is a reason why commercial suppliers such as Microsoft Corp. and Apple Computer, Inc., make a point of introducing their technical teams at splashy product introductions. Corporate IS departments can achieve the same celebratory glow on a smaller scale by taking programming staffs out to dinner or by touting their achievements in some other internally recognized manner.

"A good programmer is definitely a prima donna, and they have to have a significant amount of recognition," Yasinovsky says. A former programmer himself, Yasinovsky claims top programmers justifiably have very big egos. "They are not workers, they are creators — artists."

But other managers, such as Underhill, scoff at what he calls "the manufactured myth about the creativity of programming." He maintains that if people are treated as prima donnas — where care is taken not to ruffle their feathers — then they will act that way.

It is better to reinforce a view of programmers as part of the corporate team and to make sure they understand not only that their work is valued, but how it benefits the company.

> ALL WORKERS need recognition, but it seems especially true for programmers.

Rokoff and Yasinovsky agree that most programmers really want to know the why of what they are doing. "I have found that if you explain why it is important and how it fits in with what the company or division is doing, if it makes sense, that's where the motivation comes from," Rokoff says.

This level of openness leads to programmers who are more likely to come up with solutions vs. merely reducing someone else's solution to machine code, Underhill says. He is in the process of sending his entire staff of approximately 40 people through a multiweek course covering the fundamentals of CSX Technologies' business of railroad transportation.

"It helps them understand how what we do has a direct impact," Underhill says. It also moves his programmers closer to understanding end-user needs by helping them develop relationships with people in other business units.

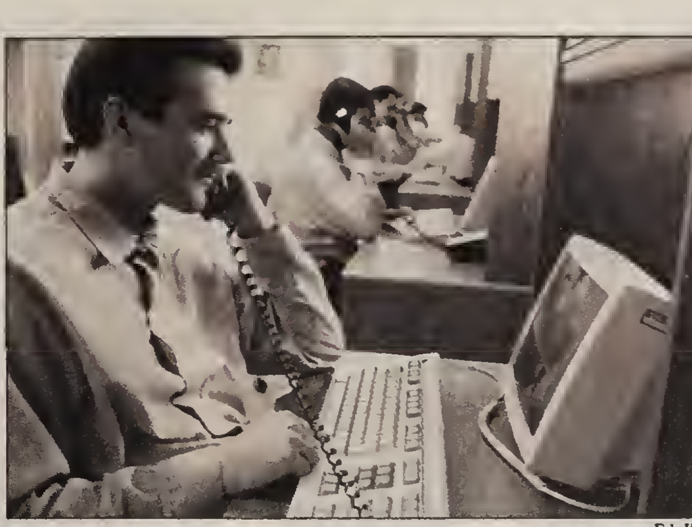
Inmates gain computer skills

BY J. A. SAVAGE
CW STAFF

IONE, Calif. — Tim Fabianowicz, juvenile delinquent, did not want to be sweating on the side of the road busting rocks for the government. "I want a nice job in an air-conditioned office," he said.

Fabianowicz, 20, is one of nine wards of the state in the Preston School of Industry who started a job late last month using Bureau of Automotive Repair computers to help California motorists find autoparts to pass their smog inspections. Fabianowicz is one of the luckiest of the 800 inmates at this institution for youthful offenders in the dry foothills near Sacramento. He is not only able to learn his way around a keyboard, but he will be paid for it and at the same time, help save taxpayers money.

Yet Fabianowicz and the others were first denied this opportunity. Earlier this year, the state legislature put language in a budget bill that stopped the program. Legislators were afraid the kids would have access to personal information about drivers — their addresses and phone numbers, for instance. The fear was sparked by a 1989 incident in which Hollywood actress Rebecca Schaeffer was slain after her attacker found her address through the Department of Motor Vehicles.



Ed Kashi

Free Venture Program's Dominguez *wants to eventually go to college*

However, Gov. George Deukmejian vetoed that particular language, and the project is revving up.

Under the aegis of the California Youth Authority's Free Venture Program, private — and in this case, public — industry can hire young inmates at low wages to do real work. The wages, usually between $4 and $5 per hour, are divvied up. Fifteen percent goes to a restitution fund for crime victims, 20% to the state for room and board, 40% into a savings fund for after the inmates' release, and the remaining 25% belongs to the inmate.

The young men in the program are "serious about changing their behavior," said Jim Coan, supervising casework specialist. "We recruited them and then held job interviews."

"It's something you can use," said Eduardo Dominguez, 20. "I want to go to college."

Julio Calderon, private industries specialist at the Free Venture Program, said the overall recidivism rate for the state's juvenile institutions is about 60%. Those working in the program were returned to institutions only 8% to 10%.

The program has only one other project in which inmates work on computers, a 4-year-old program with Trans World Airlines in Los Angeles where inmates work making reservations. Most of the other dozen Free Venture programs in other institutions are more physical, with jobs such as fashioning sheet metal or sewing women's undergarments.

The Bureau of Automotive Repair work is not as complicated as that for TWA. Using a Digital Equipment Corp. Microvax II with an Ingres Corp. Ingres relational database management system, the inmates use menu-driven screens to find parts for cars' exhaust systems.

"We put in the vehicle weight, what kind it is and the location of the caller and get a parts tracing number," said ward Kenny O'Neal, 21. From there, inmates can find a listing of parts dealers in the motorist's local area. It is all part of a state program designed to help drivers get their cars through smog inspection.

To keep them from learning personal information about the caller, if a follow-up is needed, it is referred to the supervisor of the operation.

Five layers of security are built into the application, called Smog Parts Tracking and Reporting, and inmates are only able to access the first level. Additionally, the VAX is a stand-alone operation, not linked to the Department of Motor Vehicles' main database.

The Bureau of Automotive Repairs figured it is saving $69,000 initially by using inmates and at the same time expanding its service. Prior to the program, private contractors did the work.

Regarding the concern they might use personal information improperly, Fabianowicz said, "They have a lot of reason to be uptight. We are criminals." He added that when outsiders see the inmates are not abusing the information, then they will be entrusted to do more with the system.

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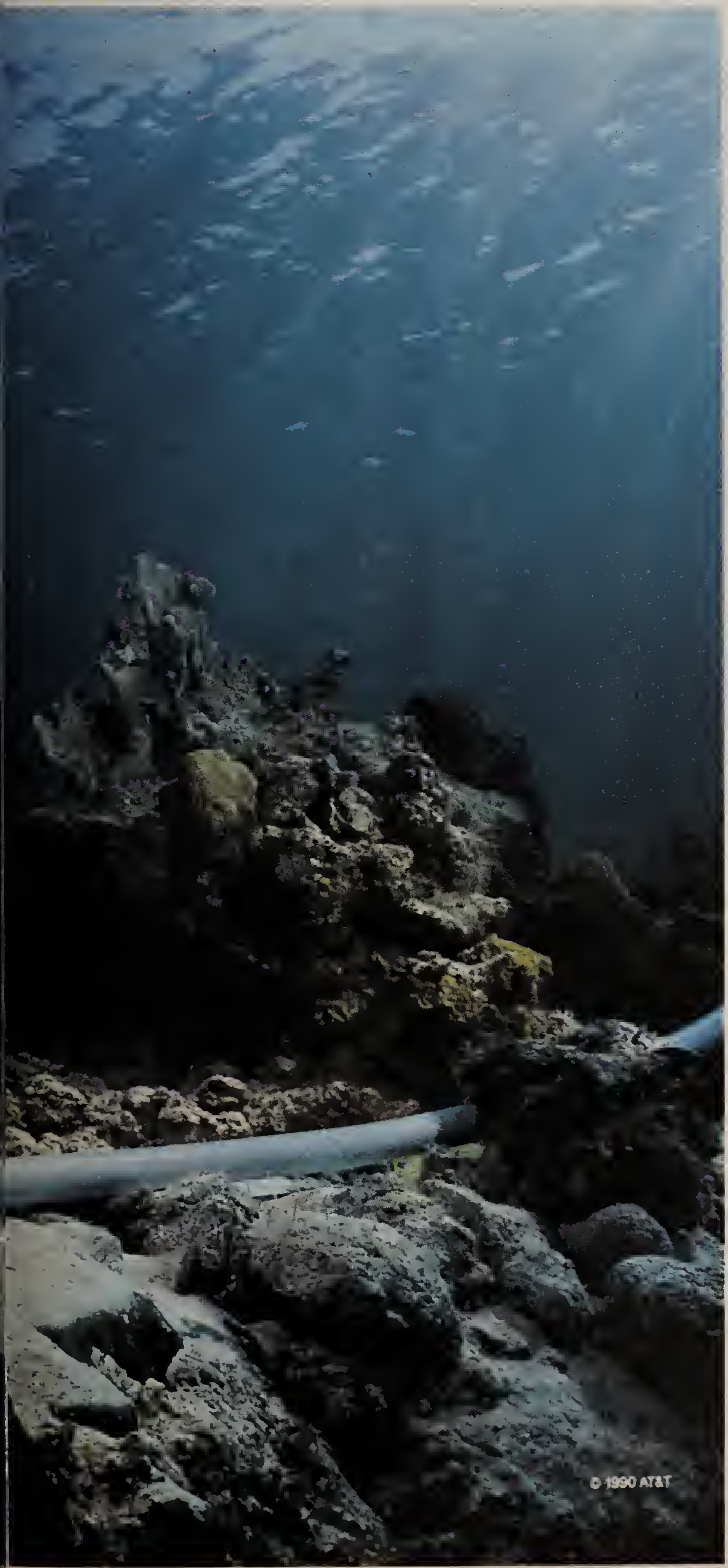

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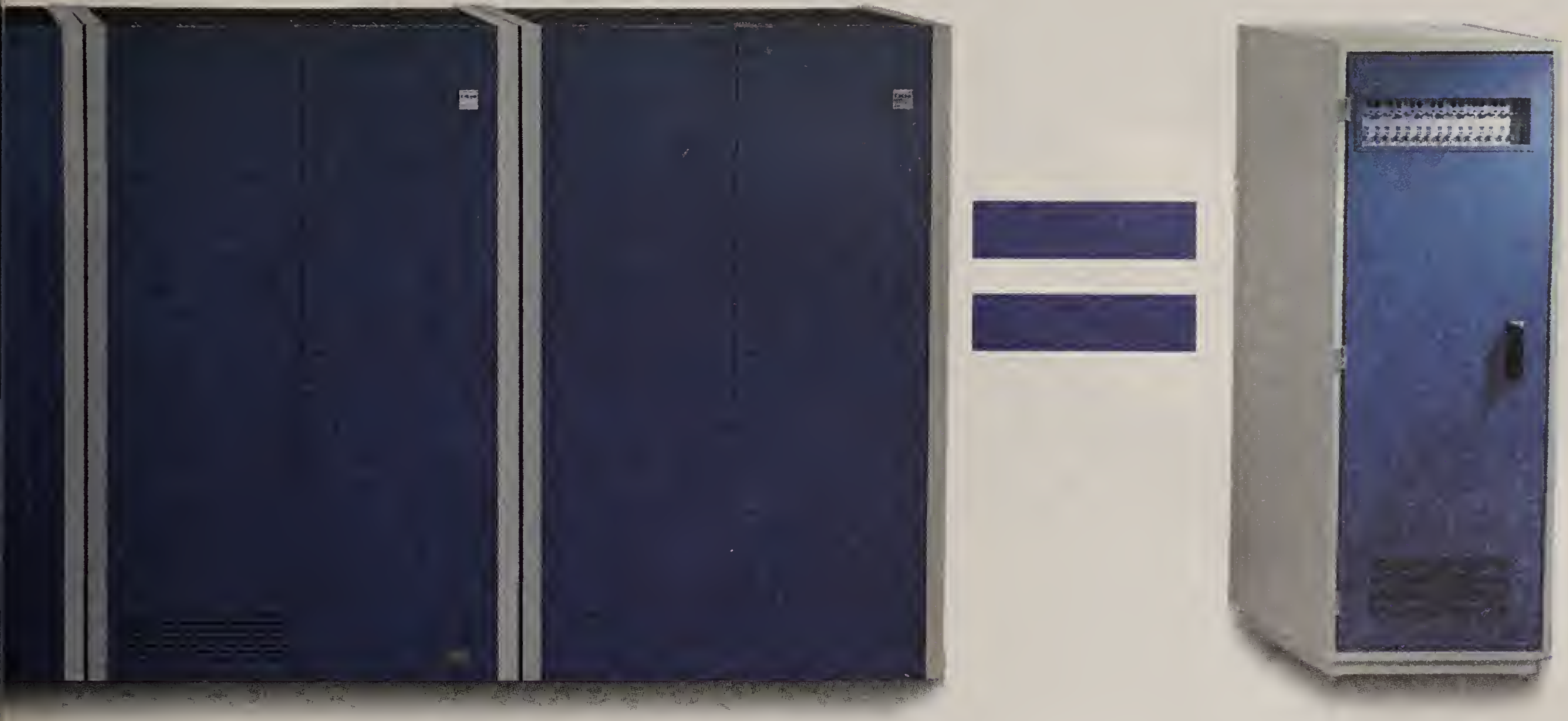

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America West having a rough flight

BY JIM NASH
CW STAFF

TEMPE, Ariz. — It was just this summer that America West Airlines seemed to have found a comfortable cruising altitude. Now, however, not-so-clear air turbulence is jolting the billion-dollar national airline.

Although Carl Faulkner, America West's chief information systems officer, could not confirm wire reports that America West lost $22 million in the third quarter and has announced it will leave up to 300 vacancies unfilled, he said he will have to cut in half his staff growth this year.

Faulkner had planned to augment his 240-person IS staff with 25 new employees in the last quarter of 1990 — on top of the 20 he will be forced to hire when the airline brings processing for its Flight Fund frequent-flier program in-house this year. Now, he explained, he intends to hire just five new employees for existing programs.

Contractor bows out

Another 20 employees must be hired regardless of economic considerations, Faulkner said, because America West's frequent-flier contractor, United Airlines subsidiary Marketing Process Innovators, Inc., will end all its contracts and return to being a division of United.

Faulkner said no projects planned at this time are being cut or curtailed as part of the hiring freeze, because the 20 new positions were to be spread over many departments and projects.

Faulkner said he still expects to increase spending for IS in real terms in the next fiscal year.

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Innovator wins award

BY SALLY CUSACK
CW STAFF

NASHVILLE — Publishing giant McGraw-Hill, Inc. has been named as Xplor International's annual "Innovator of the Year" for its customized textbook publishing system.

The ceremony recognizes McGraw-Hill's Custom Publishing System, an educational publishing system introduced by McGraw-Hill in 1989 and developed with Eastman Kodak Co. and R.R. Donnelly & Sons Co.

CEO Dionne *accepted award*

The system relies on electronic databases to customize individual textbooks, bringing together information from several sources, including journals, newspapers and magazines.

According to Robert D. Lynch, director of custom publishing at McGraw-Hill, the system operates on the Sun Microsystems, Inc. Sparc 4 platform, and the database comprises a series of Unix file structures that adhere to the Adobe Systems, Inc. Postscript standard. The system also utilizes a Kodak Ektaprinte Model 24, 92-page/min. LED printer for copy output. A second version of the database is due out the first quarter of 1991.

The award was presented to McGraw-Hill Chairman and Chief Executive Officer Joseph L. Dionne at Xplor's 11th annual conference last week.

Xplor International serves the electronic document printing industry. Previous award recipients include Automatic Data Processing, Inc. and American Express Co.

Re-engineering with IS: Three companies' intentions

BY CLINTON WILDER
CW STAFF

PALM SPRINGS, Calif. — Re-engineering business processes with information technology is easy to say and hard to do. However, at the recent *CIO* magazine/AMR International conference, three companies in three different industries described their plans to do just that.

Union Camp Corp., Kentucky Fried Chicken and Scudder, Stevens & Clark, Inc. all have ambitious plans to significantly change the way they do business in the next two to three years. They plan to do it with technologies ranging from computer-integrated manufacturing to Pepsi-pouring robots.

Kentucky Fried Chicken, a Louisville, Ky.-based fast-food subsidiary of Pepsico, Inc., plans to install a system called Merit in each of its 8,000 restaurants. Using point-of-sale terminals, personal computers and links to host databases, the company hopes to create the "computer-integrated restaurant," said Monte Jones, vice president of information resources.

The company is developing a series of standardized applications for managers to help run almost all of their restaurant functions more efficiently — among them order processing, labor management and sales reporting. The system will produce daily and weekly "report cards" for each restaurant manager and provide electronic data interchange links to Pepsi's captive food supply business for more efficient food ordering.

The chain also plans to use robotics for some operations, such as soft drink service, which can save labor costs and produce better portion control. "We have goals like getting a Pepsi to the customer in less than three seconds with no foam," Jones said.

To justify the $25 million project to senior management, Jones said, he relied on project cost savings and "softer" benefits such as potential marketing advantages. But, he added, "We quantified everything that we could to move the project forward."

Jones is no stranger to selling big technology projects to the Pepsico board. As a director in information systems at Pepsico's Frito-Lay, Inc. unit, Jones headed the project to provide handheld computers to all Frito-Lay route sales representatives. The $45 million project, highlighted at the conference by Frito-Lay President Robert Beeby, has been highly successful and won a Society for Information Management Partners in Leadership Award.

At Wayne, N.J.-based Union Camp, being able to standardize on Unix is the key to a project integrating corporate IS with the process control systems in its paper mills. "To this point, we've been kept out of the mill itself, but now industrywide standards are helping," said John Ineson, director of corporate IS.

The technology challenge is to share Unix-based information between the corporate Hewlett-Packard Co. 9000 Model 870 and two Fischer Controls, Inc. process controllers, which are based on Digital Equipment Corp. VAXs. Also tied into the network will be two HP 3000s running Union Camp's logistics and cost accounting databases.

The goal is to provide more information — on materials, production scheduling, costs and market prices — to help the mill operator make better decisions. The millwide information system will also enable more on-line training of manufacturing employees. Future plans call for the development of expert systems for use in mill operations.

Ineson said his small IS staff (220 people for a $2.7 billion company) could not develop the system on a customized basis without industry standards. "I'm not sure if standards *are* technology, but they are allowing a company with a small IS budget to do things we never did before," he said.

Jones *wants a computer-integrated restaurant*

Scudder, Stevens & Clark, a New York-based mutual funds management firm, has commenced a three-year project to replace all of its core applications with a new suite that integrates marketing, portfolio accounting and back-office functions. "Nothing should stand by itself," said Michael Petitweiss, Scudder's technology planning advisor.

Petitweiss said many of Scudder's VSE-based applications were so old that selling the software revamp project to the firm's old-line management was easier. "We already knew we had to get out of the old technology," he said.

Scudder plans to implement a three-tiered technology architecture with IBM's DB2 running on a 3090 mainframe. The firm is leaning toward the RISC System/6000 as its midrange choice for cooperative processing, Petitweiss said.

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CALENDAR

The increased role of the Apple Computer, Inc. Macintosh will be the focus of the MACIS fall conference "Networking with Macintosh" to be held Dec. 9-12 in Orlando, Fla.

The conference features presentations by MACIS members from user companies such as Procter & Gamble, Inc., Eastman Kodak Co., The Nutrasweet Co. and Union Carbide Corp. Technical topics are scheduled to include imaging, client/server development, executive support systems and networking in an IBM-dominated environment.

For more information contact MACIS, Chicago, Ill. (312) 644-6610.

DEC. 2 - 8

Executive Information Systems '90. Washington, D.C., Dec. 2-4 — Contact: Peggy Kilburn, The EIS Institute, Newton, Mass. (617) 965-8366.

The Dooley Group Executive Conference. Tempe, Ariz., Dec. 2-5 — Contact: The Dooley Group, Hopkins, Minn. (612) 935-8022.

Globecom '90. San Diego, Dec. 2-5 — Contact: Nomi Feldman, San Diego, Calif. (619) 453-6222.

The New Tools: Computer Graphics for Design/Fall '90. New York, Dec. 2-5 — Contact: The Center for Computer Graphics for Design, Briarcliff Manor, N.Y. (914) 741-2850.

Dr. E.F. Codd's Relational Model: Version 2. San Francisco, Dec. 3-5 — Contact: Codd and Date, Inc., San Jose, Calif. (408) 441-6400.

IBM Token-Ring & SNA: Gateways, Bridges and Network Management. San Francisco, Dec. 3-5 — Contact: Ann Kielblock, Kaptronix, Haworth, N.J. (201) 769-4250.

Decision Support Technology Strategic Issues Conference. Cambridge, Mass., Dec. 3-5 — Contact: Decision Support Technology Conference Registration Office, Boston, Mass. (617) 482-3596.

Sun User Group Conference and Exhibit. San Jose, Calif., Dec. 3-5 — Contact: Joanne M. Lee, Sun User Group, Mountain View, Calif. (415) 336-0564.

National EDI Systems Conference and Exhibit. Washington, D.C., Dec. 3-5 — Contact: EDIA, Alexandria, Va. (703) 838-8042.

Automatic Object Recognition Systems. Los Angeles, Dec. 3-7 — Contact: UCLA Extention, Los Angeles, Calif. (213) 825-1901.

Casexpo. Santa Clara, Calif., Dec. 3-7 — Contact: Casexpo, Arlington, Va., (703) 845-8188.

IBM IS Management Conference. Orlando, Fla., Dec. 3-7 — Contact: Gene Bruczkowski, IBM, Chicago, Ill. (312) 245-2121.

Object-Oriented Systems Development. Orlando, Fla., Dec. 3-7 — Contact: Barnett Data Systems, Rockville, Md. (301) 762-1288.

AEC EXPO Conference. New York, Dec. 4-6 — Contact: Expoconsul International, Princeton, N.J. (609) 987-9400.

DATA '90: The Information Systems Show for South Florida and Latin America. Miami, Dec. 4-6 — Contact: International Solutions, Washington, D.C. (202) 363-4628.

Sigsoft '91. New Orleans, Dec. 4-6 — Contact: Mark Moriconi, SRI International, Menlo Park, Calif., (415) 859-5924.

Macintosh/LA. Long Beach, Calif., Dec, 6-8 — Contact: Peter Kimpton, (617) 290-0412.

DEC. 9 - 15

Virtual Reality: Theory, Practice and Promise. San Francisco, Dec. 10-11 — Contact: Kim Devan, Westport, Conn. (203) 226-6967.

Fed Unix '90. Washington, D.C., Dec. 10-11 — Contact: Fed Unix '90, Bethesda, Md., (301) 229-1062.

Global Networking Conference. New York, Dec. 10-11 — Contact: Telecommunications Report, Conference Dept., Washington, D.C., (202) 347-2970.

CMG '90 International Conference. Orlando, Fla., Dec. 10-14 — Contact: General Chairman, CMG '90, CMG Headquarters, Chicago, Ill. (312) 938-1228.

Comforum. Orlando, Fla., Dec. 10-14 — Contact: Comforum, Chicago, Ill. (312) 938-3500.

Annual Flat Information Displays Conference and Exhibition. Santa Clara, Calif., Dec. 11-12 — Contact: Murray Disman, Information Associates, Menlo Park, Calif. (415) 322-0247.

DEXPO West '90. Las Vegas, Dec. 11-13 — Contact: DEXPO Registrar, Boston, Mass. (617) 730-5708.

Database World Conference & Exposition. Boston, Dec. 11-13 — Contact: Digital Consulting, Andover, Mass. (508) 470-0526.

JAN. 13 - 19

Pacific Telecommunications Conference: Accessing the Global Network. Honolulu, Jan 13-16, 1991 — Contact: PTC, Honolulu, Hawaii (808) 941-3789.

National Retail Federation Retail Industry Convention and Exposition. New York, Jan. 13-16 — Contact: NRF Convention Registrar, New York, N.Y. (212) 563-5113.

Technical Conference on the X Window System. Boston, Jan. 14-16 — Contact: MIT Laboratory for Computer Science, Cambridge, Mass. (617) 253-8861.

Telecom Skills Workshops. Waikiki, Hawaii, Jan. 17-18 — Contact: Pacicific Telecommunications Council, Honolulu, Hawaii (808) 941-3789.

NOMDA East Regional Convention. Orlando, Fla., Jan. 17-19 — Contact: Katy Dunn, NOMDA, Kansas City, Mo. (816) 941-3100.

JAN. 20 - 26

Data Visions '91. San Francisco, Jan. 20-23 — Contact: Earle Speranza, Wordtech Systems, Orinda, Calif. (415) 254-0900.

The Downsizing Conference. San Francisco, Jan. 21-22 — Contact: Digital Consulting, Andover, Mass. (508) 470-3880.

Unix Technical Conference. Dallas, Jan 21-25 — Contact: Usenix Conference Office, El Toro, Calif. (714) 588-8649.

Infotext '91. Las Vegas, Jan. 22-23 — Contact: Bob Dale, Infotext Publishing, Capistrano Beach, Calif. (714) 493-2434.

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Benchmark executable file size	**104,713 bytes (2.6 times smaller)**	282,288 bytes	282,288 bytes
Benchmark source available for review	**YES**	NO	NO
DOS memory extender included	**YES**	NO	YES
No-charge run-time for DOS memory extender	**YES**	NO	NO
No-charge EBCDIC support under CICS and IMS	**YES**	NO	NO
OS/2 Presentation Manager support	**YES**	NO	YES
Dynamic Link Library support under DOS and OS/2	**YES**	NO	NO
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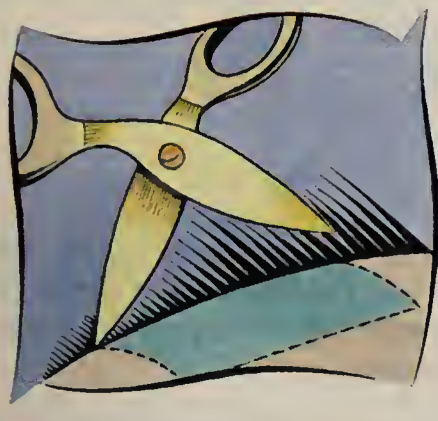

Tim Lewis

Summaries from leading scientific and management journals

"Making the technology investment decision"

By Eric Clemons and Bruce Weber

University of Pennsylvania's Wharton School Working paper

■ Investing in strategic information systems is a high-stakes decision that carries enormous risk and potentially large rewards. In fact, the investment decision is so daunting that management may err on the side of conservatism and risk aversion.

The danger is that if a firm decides not to initiate the strategic system, competitors most likely will.

IS investments for competitive advantage or strategic necessity are not well suited to traditional cash-flow analysis because of long lead time and the prospect that the strategic system will totally alter the business environment in surprising ways.

Despite the obstacles to evaluating strategic IS investments, it can be done using a more qualitative approach. The analysis should include consideration of the not-so-obvious benefits of the system, the business cost of *not* implementing the system and ways to reduce or manage the risks.

For example, a firm can deploy a prototype and gauge the marketplace response before a full-scale rollout.
— Mitch Betts

"An asset-based systems development approach to software reusability"

By Jahangir Karimi

**MIS Quarterly
June 1990**

■ On average, half of all code in a given application can be reused. Firms employing software reuse gain a significant increase in productivity as well as cost savings In the future, it may become necessary for companies who want to ensure their competitiveness.

Effective reuse is preplanned and occurs at the design level. Ad hoc reuse — attempting to reconstruct design elements from the code of an existing application — is both difficult and time-consuming. Further, design information is seldom sufficiently recorded in the actual code.

To build a collection of reusable parts, all applications tasks of the company's business are charted and then grouped into categories. The processes common to all tasks within a given category are defined in general terms; the general semantic knowledge associated with each process in the task category is called a data asset. A library of data assets is the basis for a successful reuse program. A data asset will be designed once and then adapted for use in each particular application, rather than be redundantly designed in multiple applications.

A successful reuse program requires management emphasis on increasing the productivity of the software development process rather than the quantity of code delivered. Programming incentives can be based on the number of design elements that are accepted for the reuse library. Establishing a library of reusable design components requires up-front investment before long-term cost benefits appear. — Derek Slater

"Technology in higher education: The big yawn?"

By Linda Fleit

**Cause/Effect
Fall 1990**

■ To many heads of colleges and universities around the country, information systems technology is no big deal. The very institutions that teach computing theory to a slew of future IS managers do not think of applying much of that knowledge to their own technology centers.

Why not? Fear.

Too many college presidents and vice presidents think that to make decisions about technology they have to know how to program a computer.

IS management on campus, however, can quell those fears. This may mean never discussing baud rate. It may mean making a business case, not a technical one, for the next project. It may mean providing reassurance that a technical background is not necessary to be well-informed about technological issues.

IS people need to educate these leaders in what IS needs, as well as what these leaders can expect from IS. Delivering what has been promised, being service oriented, setting realistic expectations and keeping a lid on costs will help establish IS credibility. — Lory Zottola

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PCs AND WORKSTATIONS:

Get what you need with the budget you have

BY JEREMIAH CARON

Given a blank check, most personal computer purchasers would aim for the stars and choose a 33-MHz Intel Corp. I486-based system for their next purchase. But real budgets (for real applications) will not allow this indulgence.

Analyzing price/performance on the machines, therefore, is essential, because certain applications require certain performance capabilities to be truly effective, while others call only for the modest hardware expenditure associated with a lower end PC.

Many people still buy PCs based on Intel's early chips — the 8088 and 80286. But today's resource-intensive applications have most experts recommending PCs that are based on the 80386SX at a minimum.

Intel 386SX-based systems are very popular because they combine very good performance in all general business applications with support for 32-bit applications in a very affordable package.

The reason the 386SX can support 32-bit CPU-specific software is that its internal architecture is identical to that of a true 80386.

Its 16-bit data path also allows it to make efficient use of unenhanced 16-bit, IBM Personal Computer AT-style memory and I/O bus architectures, which in turn allows PC vendors to offer 386SX-based desktop systems at a relatively low price.

Indeed, 386SX-based PCs can be had for under $1,500 from many vendors, with brand-name 386SXs (such as the best-selling IBM Personal System/2 Model 55 SX) selling for approximately $3,000.

For this minimal price increase, purchasers get a 35% to 50% performance jump over the 16-bit 80286.

For a little more money, the newer 20-MHz 386SX PCs provide a 25% to 50% increase in speed over 16-MHz 386SXs for about $5,000. This is barely noticeable in most business applications but is significant in processor-intensive applications.

In some cases, the decision to purchase 32-bit CPUs has already been made for the system buyer.

If, for example, an organization plans to standardize on Lotus Development Corp.'s 1-2-3 Release 3.1 spreadsheet, any OS/2 application or an advanced graphics application, 386-based

Continued on page 99

Caron is senior editor of "The Faulkner Reports on Microcomputers and Software" and "Microcomputer Communications," published by Faulkner Technical Reports, Inc. in Pennsauken, N.J.

BY DAVID S. MARSHAK

The new crop of low-cost, low-end workstations has added another color onto the palette for corporate purchasers looking for a desktop system.

Users considering this route will find list prices ranging from less than $4,000 for machines from Data General Corp. to more than $12,000 for IBM's RISC System/6000.

While some entry-level features are standard, such as 8M bytes of random-access memory and built-in Ethernet, purchasers need to look very carefully at other features to ensure that they're comparing oranges to oranges, particularly in the areas of performance, expandability and availability of applications. While many users tend to look at price first and then deal with the issues in this order, the best approach is to reverse the order.

The seven most prominent vendors are Sun Microsystems, Inc., Solbourne Computer, Inc., Next, Inc., IBM, Hewlett-Packard Co.'s Apollo division, Digital Equipment Corp. and DG. In the next few months, a large number of Sun's Scalable Processor Architecture (Sparc) clones will enter the market, mostly from the Far East, which will change the landscape [CW, Oct. 29].

The single most important factor in the workstation purchase decision is which workstation runs the user's desired applications. This also means those additional personal or group productivity applications to which the user has become accustomed.

The question of availability will likely come down to when — rather than whether — an application will hit the market. Most major Unix and some major PC applications are being written for all of the popular workstation platforms. The more popular the platform, the better the likelihood of an early appearance of a given application.

There are two aspects to consider when evaluating popularity: operating system and processor family. While Unix is the most popular choice of operating system, there is still a large base of applications available for proprietary systems, particularly DEC's VMS.

In addition, all Unix is not the same. When buying a Unix workstation, a user will generally get a vendor-specific version of Unix — AIX from IBM, Ultrix from DEC, DGUX from DG, etc. At

Continued on page 98

Marshak is a senior consultant at Patricia Seybold's Office Computing Group in Boston, Mass.

INSIDE

Sources Revealed
The places to buy a workstation are quickly changing. Page 101.

Buyer's Scorecard
Users rank HP's Vectra highest in PC ratings. Page 104.

Product Guide
A comprehensive list of entry-level workstations. Page 110.

Continued from page 97

this time, there are no "shrink-wrapped" applications to run across these systems.

Processor type also plays a role. While the same processors in different vendors' workstations are not necessarily binary compatible, a number of consortiums have been formed to ensure that applications will run across all implementations of a single processor type.

Binary compatibility is beginning to spawn a whole new industry of Sparc clones that could begin to affect users' buying decisions in the near future.

While workstation vendors like to play numbers games about how many applications are available for their systems, it is clear that among the reduced instruction set computing systems, most applications will be written first for Sun and Sparc, with the other architectures fighting for second place. In the overall Unix market this is really third place, because Intel Corp. 80386-based desktop Unix systems are continually fighting Sparc for the lead position.

THE KEY question — particularly for those who are bowled over by the prospect of a workstation for less than $5,000 — is: How low is low end?

In the short run, some purchasers may find that a specific application runs only on a less popular system, such as Lotus Improv running on the Next workstations. This kind of discovery may put an end to any further debate. Luckier shoppers, whose applications currently run on a number of systems, will probably want to pursue the investigation into issues such as expandability and performance.

The key question — particularly for those who are bowled over by the prospect of a workstation for less than $5,000 — is: How low is low end?

Users can quickly find themselves in the upgrade trap — paying a lot more than expected as they discover that they have to add a hard disk, a faster processor, more memory or color. Price increases in this kind of situation can be rapid and sometimes astronomical.

For example, additional memory to run much more than the basic applications can cost almost as much as the base machine itself, typically ranging from $3,000 to $4,000 to build up a $5,000 to $6,000 machine from 8M to 16M bytes.

The way to avoid the trap is to be knowledgeable about the reason for purchase. The lowest end machines are just not for power workstation users.

The major decision is usually disk-full vs. diskless workstations. Most of these entry-level offerings are diskless, although some permit the addition of internal drives.

Diskless workstations can only run on a network. They access the operating system, applications and data files from network servers.

The problem is that every time a diskless workstation needs to get an application or any data, there is a simultaneous decrease in the workstation's performance and an increase in network traffic.

In addition, workstations usually run operating systems that support virtual memory, which means that when the workstation runs out of RAM it pages memory onto disk.

In the diskless environment, this paging is to a disk on the network, potentially creating even more performance problems for both the workstation and network.

A potential purchaser must evaluate this price/performance trade-off, particularly when choosing a diskless workstation that cannot have an internal hard drive added at a later date, leaving significantly slower external drives as the only upgrade option.

The major advantage of diskless workstations is price. Leaving out the internal drive is the only way that the less than $5,000 workstations can be achieved (with the exception of Next, which includes a 105M-byte internal hard drive in its $4,995 Nextstation).

There are, however, other reasons to consider these machines. One is that centralization of data on the server makes it easier to administer and assure security and data integrity, says Warren Mootrey, product manager for DG workstations.

Adding disk, either internally or externally through the small computer systems interface port, can be very expensive, however, and users who know that they will need a local drive may want to look at configurations that include it in the base price — such as the Sun Sparcstation IPC or the IBM RS/6000. Adding a disk can range from $1,500 for the Solbourne S4000, to $2,500 for HP/Apollo workstations, to more than $3,000 for an external disk for the DG Aviion, to over $5,000 for two internal drive configurations for the DEC workstations.

While millions of instructions per second (MIPS) and other performance numbers abound in workstation-to-workstation comparisons, and entry-level systems range from 10 MIPS to 27½ MIPS, processor speed is perhaps the least important factor in selecting a workstation. Other factors, particularly the amount of memory, disk storage and where the data resides, contribute a great deal more to the user's perception of system performance.

WORKSTATIONS

The choices

- Sun actually has three entry-level systems, each based on the popular Sparc RISC architecture.

At the low end sits the Sparcstation SLC, which provides 15.5 MIPS at $4,995. For low-end color, Sun offers the Sparcstation IPC. The third — the Sparcstation 2 — is aimed at power users who need more expansion capabilities and the ability to use higher level graphics.

- Solbourne, which also produces workstations and servers based on Sparc, has tried to play Compaq Computer Corp. to Sun's IBM — that is, providing high-level compatibility without falling into the clone role.

The firm just unveiled the S4000, an entry-level workstation that runs at more than 25 MIPS for less than $9,000. Adding a 200M-byte hard disk increases the cost to $10,495, and adding color increases the cost of a diskless or disk-full system by $2,500.

- The low end of the IBM RISC workstation family is the high end for entry-level systems. IBM's RS/6000 Powerstation 320 is rated at 27½ MIPS with a base price of $12,995. A similarly configured color system with 16-in. monitor is priced at just over $15,000.
- After acquiring Apollo, HP integrated the HP and Apollo 68000-based workstations to offer an entry-level machine at less than $5,000. The HP/Apollo entry-level offerings consist of three models. At the low end, the HP/Apollo 9000 Series 400 Model 400DL provides 12 MIPS for a base price of $4,990. The more expandable HP/Apollo 9000 Series 400 Model 400T provides 12 MIPS at a base price of $6,890.

The third HP/Apollo workstation, the HP/Apollo 9000 Series 400 Model 425T, provides 20 MIPS at $8,990, with upgrades to color and internal disk drives priced the same as those on the 400T. These HP/Apollo workstations will run either HP's Unix or Apollo's own Domain operating system.

- DEC offers workstations based on the VAX architecture and the RISC chip from Mips Computer Systems, Inc. The Vaxstations run VMS or Ultrix, while Mips-based Decstations run Ultrix only.

The VAX-based entry-level workstation is the Vaxstation 3100 Model 30 with a base price of $5,950. A similarly configured color system with 15-in. monitor is priced at $8,950, and a system with two 104M-byte internal disk drives is priced at $11,100 (monochrome) and $14,700 (color). The lower end of DEC's two entry-level RISC-based workstations is the Decstation 2100, which is rated at 11 MIPS and priced from $4,995.

A step up is the Decstation 3100, which provides 15 MIPS at a base price of $8,900. A diskless color workstation with 15-in. monitor is priced at $12,340, and a system with two internal disk drives (104M and 209M bytes) and a 19-in. color monitor is priced at $21,300.

DEC's Vaxstations running VMS have the advantage of running a lot more software, particularly commercial and business applications. The Decstations, however, offer better price/performance measurements.

- DG, which now boasts the lowest priced RISC workstation,

Continued on page 100

Use benchmarks to your best advantage

BY PHILIP MAGNEY

Contrary to what is often suggested, benchmarking computer systems is not a black art, but caution is urged when evaluating them.

One issue is understanding which benchmarks to look at for your intended application. The benchmarks listed (see chart) measure various aspects of performance:

- **The Khornerstone benchmark** is representative of computer performance for a mix of business and scientific applications. It is based on the results of 22 tests measuring CPU, disk I/O and floating-point performance.
- **The transaction processing benchmark** measures performance in a multiuser setting of 20 users. The test is very disk-intensive and is representative of commercial applications.
- **The Ghraphstone (graphics) benchmark** is based on 122 tests measuring drawing rates for a variety of graphics elements. The results shown for workstations represent graphics performance within an X Window System environment.

Benchmarks cannot tell you everything, however. For example, notice that the presence of a dual processor on the Compaq Systempro does not result in performance improvement. To measure the advantages of a multiprocessor system, you need to modify the benchmarks.

An extended use of benchmarks is to use them to determine price/performance. The simplest way is to divide the list price of the system by the appropriate benchmark, obtaining a dollar-per-benchmark figure. Lower values represent a better price/performance. •

Magney is general manager at Workstation Laboratories, an independent hardware testing lab in Irving, Texas.

Finish line

Representative system benchmarks show the ALR and Mobius machines to be nearing – and meeting – workstation price/performance

System	CPU/MHz	Khornerstone	Ghraphstone	Trans. Proc.	Price/Perf.**
IBM RS/6000/320	IBM RISC/20	54,661	29,384	35.64	.53
Decstation 5000	R3000/25	26,456	31,940	18.29	.79
Decstation 3100	R2000/16.7	15,285	15,493	12.85	1.31
Sun Sparcstation 1	SPARC/20	12,899	26,935	19.15	1.84
Mips Magnum	R3000/25	29,626	20,542	11.96	1.06
Compaq DP486/25	1486/25	13,513	8,232*	18.71	1.68
Compaq Sys. Pro	1386/33 (2-CPU)	9,289	n/a	26.3	4.21
Compaq DP386/33	1386/33	9,272	7,939*	17.69	2.27
ALR Powercache	1486/33	18,644	11,760	26.3	1.08
Altos 486/5000	1486/25	12,953	n/a	20.22	3.24
AST Prem. 486/25	1486/25	11,754	6,484*	23.32	1.37
Mobius PWS-425	1486/25	11,169	18,226	21.53	1.16
IBM PS/2/55SX	386SX/16	2,714	2,890*	n/a	1.92
IBM PS/2-70	1386/25	6,800	4,476*	n/a	1.94
Acer 1100	1386/16	3,094	3,343*	n/a	n/a
Televideo 386	1386/16	2,817	1,624*	n/a	n/a
Compaq DP 286	286/12	1,295	n/a	n/a	n/a
Epson Eq. III +	286/10	833	n/a	n/a	n/a
IBM PC/XT	8088/4.77	321	n/a	n/a	n/a

*Graphics conducted using VGA graphics; all others have 1024- by 768-pixel or higher resolution displays

**Price/performance in this case was determined by dividing system price by the Khornerstone rating. The resulting figure is dollars per Khornerstone

All ratings are linear

The Khornerstone rating is expressed in Khornerstones per second; the Ghraphstone is expressed in Ghraphstones per second; the Transaction Processing test is expressed in transactions per second for a system with 20 users

Source: Workstation Laboratories

CW Chart : Doreen St. John

Continued from page 97

PCs are a must.

Using 25- and 33-MHz 386-based PCs provides roughly twice the speed of 16- and 20-MHz 386SX-based machines. From a price/performance view, 386-based computers from lesser known vendors are actually less or slightly more expensive than the 386SX-based computers from name-brand vendors.

PERSONAL COMPUTERS

Intel 386-based PCs now represent the broad midrange of the market and are suitable for virtually any low- or high-end application. They range from as low as $2,000 to as high as $20,000, depending on random-access memory, clock rate and hard disk storage provided.

These PCs are suitable for power users running multiple business applications or single, compute-intensive applications, such as advanced desktop publishing or computer-aided design, that will significantly benefit from the performance increase of 32-bit 386 computing over 386SX computing. They are also the best platform for Microsoft Corp.'s Microsoft Windows operations.

When deciding between a 25- or 33-MHz 386, pricing is the key. Thirty-three-MHz 386 systems are generally $1,000 to $4,000 more than similarly equipped 25-MHz 386 models.

Users can expect something on the order of a 30% performance increase when moving from a 25-MHz PC to a 33-MHz PC (depending on factors such as I/O performance and memory caching), but this does not necessarily translate into a 30% productivity increase. In fact, it is likely that users recalculating fairly large but routine spreadsheets will hardly notice the difference — this operation will be very fast with either CPU.

Pricing for 33-MHz PCs is close enough to that of 25-MHz PCs to warrant their purchase for power users but far enough apart to make 25-MHz boxes a better choice for the majority.

The performance increase of I486-based computers over 386-based systems is, on the other hand, rather tremendous. This boost is primarily because the highly integrated I486 includes both an on-chip 8K-byte RAM caching system and a built-in floating-point arithmetic coprocessor.

Twenty-five- and 33-MHz I486-based PCs can perform as much as three to four times faster than their 25- and 33-MHz 386 counterparts, providing throughput capabilities that can truly be compared with that provided by much more expensive minicomputer systems.

The prices of these machines, however, are correspondingly prohibitive. Dell Computer Corp., for example, which is known for its very low prices, sells the base configuration of the 33-MHz 386-based System 333D for $3,349 and offers its 33-MHz I486-based System 433E for nearly $8,000.

As far as single-user applications are concerned, I486-based PCs enter the picture only for those few who are maxxed out on the 386 (very rare) and for those who consider money to be no object (even rarer). Actual and projected sales bear this out, as the market for I486s remains tiny compared with the markets for 386SX and 386 PCs.

Serving as a LAN

More often, the I486-based machine is used as a local-area network server, and justifiably so. Many vendors, including IBM, Compaq Computer Corp., Hewlett-Packard Co. and AT&T, offer 25-MHz and 33-MHz I486-based "super" PCs with very large I/O support capacities specifically designed for the LAN server market.

The majority of these systems fall into the $12,000 to $18,000 price range for base configurations, with the Compaq Systempro, which supports dual processors, topping off the charts with a $25,000 model.

But the 486 is not the only choice for servers. Many businesses implementing relatively small networks have had great success using 286-based servers, such as the IBM PS/2 Model 60, if a high-performance disk storage system is employed. Similar systems based on the 386SX can provide even better performance at a price that is only slightly higher than that of a 286-based server.

A 20-MHz 386SX-based LAN file server with 4M-byte RAM and a high-speed 300M-byte hard disk drive will cost between $5,000 and $6,000, for example, while a similarly equipped 25-MHz 386-based server will run at least $1,000 to $2,000 more. There will be a performance increase with the 386 system, but the cost savings of the 386SX may more than offset this benefit for many users.

Server systems based on the 80386 processor, including computers such as the IBM PS/2 Model 80 386, AT&T Workgroup System 6386/33 and the Compaq Systempro, are priced higher than 386 systems intended for single-user applications and are better equipped to handle mid- to large-size networks than are 386SX-based servers.

These systems are usually equipped with a number of expansion slots and with room for at least two internal hard drives and a tape backup subsystem.

Average pricing for the powerful 386 PCs hovers around the $10,000 mark but varies according to vendor, hard disk storage provided and bus architecture.

If you do opt for the 486 machine, you can't forget the various types of bus architecture. Most of these computers, including Compaq's Systempro (with 486 CPU card), HP's Vectra 486 PC and Advanced Logic Research, Inc.'s Businessveisa, are based on the 32-bit Extended Industry Standard Architecture (EISA) bus design.

Others, including the recently released IBM PS/2 Model 95 XP 486, ALR Powercache 33/4 and NCR Corp. PC486/MC, are based on IBM's Micro Channel Architecture (MCA) bus design.

Right now, there is little to distinguish the performance of

Continued on page 100

Now and then

Performance, disk capacity are likely to jump on both hardware types while price will stay essentially the same

	1990		1995	
	PCs	Workstations	PCs*	Workstations*
System price	$1,000 - $15,000	$8,000 - $100,000	$1,000 - $15,000	$6,000 - $100,000
Performance range (Khornerstones)	1,000 - 15,000	10,000 - 90,000	10,000 - 60,000	20,000 - 200,000
Memory size	0.5M - 8M bytes	4M - 64M bytes	16M - 64M bytes	32M - 256M bytes
Disk capacity	20M - 160M bytes	100M - 1G bytes	200M - 1G bytes	600M - 4G bytes
Microprocessor	386, 286, 486	RISC, 68030	486, 386, 586	RISC, 68040, 68050
User interface	MS-DOS Several GUIs	Unix X-Window	Presentation Manager, Windows	Motif Open Look
Leading models' yearly sales (units)	100,000 - 1M	5,000 - 50,000	100,000 - 1M	10,000 - 100,000

*Projected

Source: Computer Industry Almanac

CW Chart : Doreen St. John

The true cost of owning PCs, workstations

BY THOMAS JOHNSON

When you calculate the cost of personal computers and workstations in a local-area network, hardware and software represent only 30% of the true cost.

The other 70% consists of items such as training and development, support, data communications and other miscellaneous factors (see chart).

Nolan, Norton & Co. has devised an algorithm to help get a handle on the true annual cost of PCs and workstations in an organization.

First, determine the number of potential PC/workstation/LAN users in the business. Next, categorize all potential users into five levels of maturity:

- **Not automated** (off the chart). These are people who do not have or use PCs or workstations. *Multiply the number in this category by $0.*
- **Midpersonal phase.** These are people using one or two applications to automate personal tasks, usually word processing and spreadsheets. The use is spotty and incidental to the business. They know where the information center is, get basic training and ask for simple help. *Multiply the number of users in this category by $3,400.*
- **Late personal phase.** These are people reaching the limit as personal task automaters. They have many individualized applications, are regular users, are connected into basic mail systems and do simple upload and download of data.

They know about as much as there is to learn in the information center and are frustrated because they aren't connected to the right resources. *Multiply the number of users in this category by $5,800.*

- **Midconnected phase.** These are people who are now doing work as part of an organization. They have applications for the department or business that someone built for their client/server infrastructure. They spend a lot of time on the PC or workstation and are connected with others.

These people are usually found only in departments with at least one PC or workstation per person. Business processes and organization structures have been streamlined and are more teamwork-oriented. *Multiply the number of users in this category by $14,100.*

- **Late connected phase** (off the chart). These people work in organizations that are client/server-based and have a culture of dynamic, growing organizations with good management practices in place.

Some examples of these organizations are fully configured trader rooms in Wall Street firms, fully operational computer-aided design units and customer service units with imaging, data and voice infrastructure. *Multiply the number of users in this category by $25,000.*

One company we work with has 3,000 employees, with 2,000 potential users. Three hundred are "not automated," 900 are "midpersonal," 400 are "late personal," 300 are "midconnected," and 100 are "late connected."

Once you do the calculations, the total comes to $12,110,000. We estimated that the firm is spending about $11.5 million on PC/workstation LANs per year. They had estimated their cost at $4 million, but that was primarily budgeted hardware and software costs. An in-depth total spending analysis showed they were spending $10.3 million annually.

The figures listed are compiled from studies conducted by Nolan Norton in the past three years in more than 100 organizations in North America and Europe. •

Cost of ownership

Using these figures, you can calculate how much it will cost to do business with a PC/workstation/LAN infrastructure

	Dollars per user per year		
	Mid-personal phase	Late-personal phase	Mid-connected phase
Hardware	$800	$1,100	$3,300
Software	$360	$550	$1,800
Development and training	$900	$1,400	$3,500
Support	$780	$1,600	$2,000
Data	$90	$200	$1,200
Communications	$100	$400	$1,500
Other	$370	$550	$800
TOTAL	$3,400	$5,800	$14,100

Source: Nolan, Norton & Co.

CW Chart : Doreen St. John

Johnson is executive director at Nolan Norton Institute in Lexington, Mass.

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EISA systems from MCA systems. In fact, there has not been a lot of proof that either MCA or EISA, when used in conjunction with 386 or I486 CPUs, gives users a lot more than the standard IBM PC AT, or Industry Standard Architecture, bus (when enhanced by memory caching and fast I/O) in single-user applications.

There has been evidence, however, that both EISA and MCA prove very effective at handling the complex I/O demands of mid- to large-size networks, which accounts for the emphasis given to LAN applications by 386- and I486-based EISA and MCA PC vendors.

When bus-mastering LAN adapters and disk-drive controllers are utilized, such as the Compaq Intelligent Drive Array controller and the IBM MCA small computer systems interface, adapter network performance can be significantly improved. It is in such environments that the I486-based PC as a LAN server can, indeed, be very cost-effective.

Apple's hanging in

And what about Apple Computer, Inc.? Motorola, Inc.'s CPU-based Apple Macintosh II systems are very popular in the corporate market for graphics-intensive applications such as desktop publishing, drawing or design.

They can be seen as competitors to any 386SX-, 386- or I486-based computer that is used with a graphical user interface such as Microsoft Corp.'s Windows or OS/2 with Presentation Manager.

The 25-MHz 68030-based Macintosh IICI computer provides performance comparable to 25-MHz Intel 80386-based PCs in similar applications, such as Microsoft Word, Aldus Corp.'s Pagemaker and Autodesk, Inc.'s Autocad. The 40-MHz 68030-based Macintosh IIFX's speed can be compared with Intel I486-based systems performance.

The problem comes in with price. Although Apple products are priced similarly to IBM and Compaq high-performance systems and carry a reputation for ease of use and learning, corporate users generally perceive the Macintosh investment to be more costly than the Intel CPU-based personal computer investment.

This is largely because of the lack of Macintosh system competitors and the higher prices associated with Apple Macintosh add-on products and peripherals.

Every personal computing platform has its price/performance advantages and disadvantages, so the issue essentially boils down to preference and money.

The general rule of thumb in most businesses is to purchase the most PC affordable, and various buying trend analysis reports indicate that 386SX-based PCs are poised to take over the low-end market, while 25- and 33-MHz 386 PCs will be the general-use platform of choice for quite some time.

Additionally, 386 systems with 32K- or 64K-byte RAM caching systems and fast hard disks based on the IBM PC AT bus architecture are clearly outselling both EISA- and MCA-based computers. The 32-bit bus architectures are, however, finding a home in LAN server applications, which is likely to be the case until more bus-mastering I/O boards that take advantage of EISA and MCA enhance single-user applications enough to affect the buying habits of business users. •

WORKSTATIONS

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offers three entry-level Aviion machines — AV 100, AV 200 and AV 300 — based on the Motorola, Inc. 88000 RISC family.

At the lower level is the recently announced Aviion AV 100, priced at $3,995 for 17 MIPS. Next is the more expandable Aviion AV 200, priced at $5,590. A similar configuration with a 179M-byte external disk is priced at $8,950.

The Aviion AV 300 provides 17 or 20 MIPS, depending on which processor is chosen, at a base price of $8,650. A similar configuration with a 322M-byte external disk is priced at $14,095, and a diskless color configuration with a 19-in. monitor is priced at $11,995 — including 332M bytes of external drive at $17,390.

These prices are for a 16.67-MHz CPU. For the 20-MHz CPU, add $2,000 to each price. The Aviion workstations have a reputation as price/performance leaders.

• Steve Jobs recently introduced Next's workstation family based on the Motorola 68040 CPU. Next machines are particularly appealing to application developers because of the Nextstep object-oriented application environment.

Business users have tended to shy away because of the lack of applications. However, there has recently been a slew of products announced for Next from companies such as Wordperfect Corp. and Lotus Development Corp., the latter debuting Improv, a spreadsheet package, on the Next platform.

Due to ship this month are the new "pizza box-style" Nextstation and the Nextcube. The latter machine retains its famous cube style and provides more expendability and more storage options, including a 256M-byte rewritable optical drive.

Next has also announced new color options due in the first quarter of 1991.

Ultimately, the users who make the most successful choice will have concentrated on the applications and expandability issues, having left the performance numbers game for those who want to brag about snagging "15 MIPS for under $5,000." •

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Cost-cutting measures can rechannel reseller routes

BY ALAN RADDING

The price drops that are turning the heads of people who purchase high-performance personal computers and workstations have also begun restructuring and multiplying the paths through which these machines are sold.

The biggest news is on the workstation side, where users will ultimately be able to choose among the same channels as high-end PC purchasers, including direct sales forces, value-added resellers (VAR), retailers and mail-order companies.

Until now, customers in search of a reduced instruction set computing (RISC)-based Unix workstation had two choices: buy through a specialized VAR or the manufacturer's direct sales force.

While there was competition among different manufacturers, it was rare to encounter it between two VARs representing the same manufacturer or between a manufacturer's VAR and the direct sales force.

Reshaped

The new sales channels are still evolving, but the outline is already apparent. In addition to the direct sales force and a few selected VARs, workstations will be available through a growing number of computer retailers. RISC workstations will even be available through direct response (mail-order) marketers. "Eventually, they will be sold by everybody," predicts Steven Hess, executive vice president at Creative Strategies Research International in Santa Clara, Calif.

There are two reasons these lower priced machines open up the selling channels: For one thing, manufacturers want to target their low-end models at a wider market than the scientific/engineering segment.

For another, a $5,000 workstation offers a lower rate of return than a $20,000 one. "At these prices, the companies just can't afford to sell direct," says Tom Farre, associate publisher of *Reseller Management*, a monthly magazine in Morris Plains, N.J.

Sun Microsystems, Inc. in Mountain View, Calif., has taken its first step toward wider availability. The firm has signed two computer retail franchisers — Intelligent Electronics and Microage — to be outlets for Sun products.

Digital Equipment Corp. has also established a channel into the computer retail market by teaming up with Merisel, a California-based wholesale distributor.

Such arrangements give rise to something workstation sellers have not yet experienced: competition among channels as well as between sellers within a channel. Price wars may not be far off.

Resellers are already expressing fears that the increased competition will reduce profit margins to the slimmest of levels, as it has in the PC market.

"My No. 1 concern is that it may open a Pandora's box," says Mike Shook, president of CAD Systems of Carolina, Inc., a Sun reseller in Raleigh, N.C.

Some manufacturers will try to control sales by limiting the number of retail outlets carrying workstations, says Joan Reagan, director of computer distribution channel service at Gartner Group/Infocorp in Santa Clara, Calif. But no matter what steps vendors take, she says, within three or four years, workstations will be a commodity product available anywhere high-end PCs are.

Sun is one of the manufacturers trying to maintain a measure of control. The company plans not only to limit the number of franchisers but also to choose them carefully, based on the training and support they can provide, says Xavier Candia, manager of channel development. Even with tight control, however, there is always the possibility of channel conflict, Candia concedes.

In the meantime, resellers are taking steps to ensure they've got the right cards for the newly competitive game. Two aces, Shook says, are the service levels provided by resellers as well as the utility software they can provide.

"For the first 90 days after we install one of these, we're in constant contact with the customer," he says.

"The higher up you go [in the reseller hierarchy], the greater the service component," says Bob Brown, president of R. G. Brown & Associates, an Atlanta-based vendor research firm.

As the new sales channels take shape, however, these distinctions may lose their clarity.

"Forty percent of our retailers proclaim themselves VARs," says John Venator, executive director of ABCD: The Micro Computer Industry Association in Schaumberg, Ill. Most of these retailers already sell high-end PCs and networks and will increasingly sell RISC-based Unix workstations.

The strength of the local retailers, Venator says, is the nearby support and service they provide. "People don't want telephone support or even third-party, next-day service. They want same-day local service."

The investment in staff and training to sell workstations will be high, however, and Venator predicts a shakeout. "RISC is going to require more training and more money," Venator says. "Some won't survive."

The added investment will also play into resellers' hands by reducing the retailer's ability to wage aggressive price campaigns.

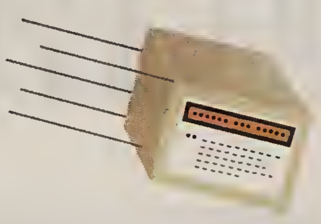
As the new channels evolve, established workstation resellers will have to find solace with a smaller slice of a much larger pie, while buyers will find that they can shop for the combination of price and service that's right for them. ●

Radding is a free-lance writer in Newton, Mass.

Mail-order currents

There are fewer ripplings in PC sales channels, but more than one new wave is cresting in the direct-response mail-order market.

Many corporate purchasers have avoided this channel because of the apparent seesaw-like trade-off between low price and little — if any — support. The only people who would risk sticking their toe into the direct-response channels were those with a considerable in-house support staff and "some sophisticated buyers who might go to direct response to pick up a couple more machines and low-ball it," says John Venator, executive director of ABCD: The Micro Computer Industry Association in Schaumberg, Ill.



Many mail-order firms, including Dell Computer Corp. in Austin, Texas, Northgate Computer Corp. in Eden Prairie, Minn. and Gateway 2000 are working to change that picture, however, boosting their service and support, providing toll-free, 24-hour telephone service and establishing relationships with nationwide on-site service organizations. Northgate recently teamed up with Sorbus to service its clients, and Dell has aligned with Xerox.

The beefed-up service has some analysts predicting that corporate purchasers will begin taking a more serious look at this channel. "There are some very good mail-order houses that provide as much or better support than retailers," says Steven Hess, executive vice president at Creative Strategies Research International in Santa Clara, Calif. The only thing they lack, he continues, is vertical-market expertise.

Clashing with the new support offerings is a move by some of the direct-response sellers to place their machines in retail-store shelves. For instance, Dell has started selling its product line through Soft Warehouse, a PC mass merchandiser, says Dell spokesman Brian Fawkes.

To blur the distinction between direct-response and other channels even further, Dell and Northgate are starting to offer RISC-based products. Dell already offers a RISC-based disk drive array through Soft Warehouse and mail-order, and Northgate will soon offer a Sparcstation at "a very competitive price," says Art Lazere, chairman of the firm.

Such a machine may be the death knell for the higher margins currently found in the workstation business.

ALAN RADDING

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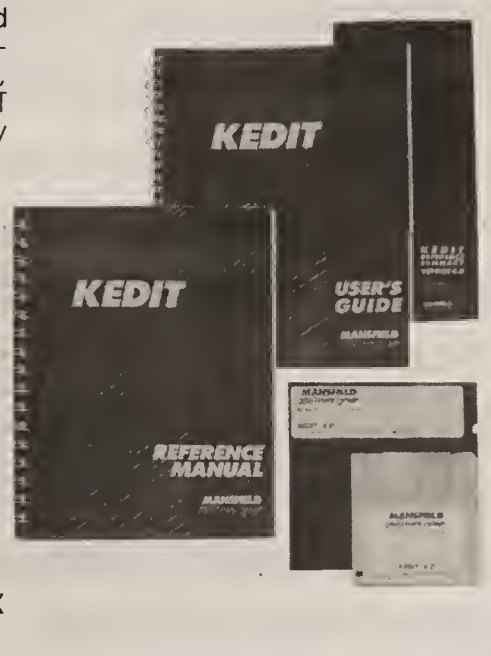
"While KEDIT remains true to its heritage in retaining compatibility with the mainframe XEDIT, it is also one of the most feature-packed PC text editors around."
PC Magazine, 10/31/88

MANSFIELD
Software Group
P.O. Box 532, Storrs CT 06268
(203) 429-8402

DOS Version: $150.
OS/2 Version: $175.
(includes DOS version)
Shipping: $3.
Demo version available.

KEDIT is a trademark of the Mansfield Software Group, Inc



Now that ev
afford a Macintosh, whic

This is all of them. From left to right: The new Macintosh Classic, the well-established Macintosh SE/30, the Macintosh Portable, the new Macintosh LC, the new Macintosh IIsi, plus the Macintos

In 1984, Apple introduced the first Macintosh® on the simple premise that people shouldn't have to learn to work with computers. Computers should learn to work with people.

Today, Macintosh is still the only computer system designed from the chip up on this principle.

Meanwhile, other computer companies are scrambling to make their conventional technologies emulate what is still unique about Macintosh. But no other personal computer comes close to matching the record of stability, consistency, and innovation enjoyed by the Apple Macintosh.

At $999,* the computer people actually use can be used by a lot more people.

We're now introducing three new Macintosh personal computers. At prices that make powerful computer technology not only accessible, but affordable as well.

Together, they put much of the power of our most advanced computers into our least expensive ones.

The Macintosh Classic.®

It has everything that makes a Macintosh a Macintosh.

Built-in networking. A SuperDrive™ disk drive, which reads both Macintosh and MS-DOS files.

And a $999* price that includes the built-in monitor, 1MB of RAM, keyboard, mouse, and system software.

The 40MB hard disk is optional.

Its processor is an 8 MHz 68000 chip. And it outperforms ever its popular predecessor, the Mac® SE.

The charts shown use figures included in a 1990 study conducted by Diagnostic Research, Inc., among Fortune 1000 MIS managers familiar with Macintosh and MS-DOS or Windows systems. Call and we'll send yo
logo, Mac, Macintosh, and "The power to be your best" are registered trademarks, and SuperDrive is a trademark of Apple Computer, Inc. MS-DOS and Windows are registered trademarks of Microso

erybody can
n one should you afford?

li, and the Macintosh IIfx. Have we left anybody out?

The Macintosh LC.

The new, low-cost Macintosh LC introduces the exquisite qual- iy of Macintosh color and graphics to a new, wider world.

With its 16 MHz 68020 processor, it runs all the thousands of lacintosh programs at impressive speed. And, with an optional pple® IIe Card, it runs thousands more Apple II applications as vell. The Macintosh LC expands by adding a card to its standard ot. A 40MB internal hard drive is standard.

A built-in video chip runs either an Apple monochrome or lw-cost color monitor — without adding a video card.

And the Macintosh LC, like the Mac IIsi, even lets you record ur voice and other sounds into the computer.

Which will soon make voice-annotated E-Mail, spreadsheets, id tutorials a standard Macintosh feature.

The Macintosh IIsi.

The Macintosh IIsi is a powerful building block for business. With a 20 MHz 68030 microprocessor, it delivers serious number-crunching at the most attractive possible price.

Into its sleek package are compressed all the powerful essentials of the Mac II line.

Including an optional 32-bit NuBus™ slot supporting high-performance graphics and accelerator cards.

Along with advanced networking systems like Ethernet and Token-Ring. Plus a 40 or 80MB hard drive. Built-in video chips drive four different Apple monitors.

This is a family show.

In 1984, we offered only one Macintosh. As of today, you can choose from seven different models.

And although they include some of the most powerful personal computers ever made, every Macintosh runs with the same point-and-click simplicity.

The way a computer system should work, of course.

But Macintosh is still the only computer system in the world that actually works this way.

It doesn't cost anything to ask.

With one call, we'll get you to someone who will show you our most affordable new computers. Just dial 800-538-9696, ext. 350.

Now that everybody can afford a Macintosh, come in and find out why you're going to want one.

The power to be your best.®

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BUYERS' SCORECARD

Vectra rates highest in PC satisfaction

Personal Computers

Total scores reflect all criteria and their user-assigned importance
Response base: 50 users per product
(Scores are rounded)

Product	Three highest ratings	Three lowest ratings
Hewlett-Packard Co.'s Vectra 386 series SCORE 66	Reliability Ease of use Availability of application software	Value for the dollar Quality of documentation Availability of upgrade options
Compaq Computer Corp.'s Deskpro 386 series SCORE 65	Availability of application software Compatibility with installed hardware Reliability	Responsiveness of vendor service Vendor service and support Value for the dollar
IBM's PS/2 (386 models) SCORE 65	Availability of application software Compatibility with current software Ease of use	Quality of documentation Value for the dollar Effective disk speed
Apple Computer, Inc.'s Macintosh II series SCORE 63	Ease of use Ease of installation Availability of application software	Responsiveness of vendor service Vendor service and support Value for the dollar
AT&T 's 6386 series SCORE 62	Availability of applications software Compatibility with current software Ease of use	Quality of documentation Value for the dollar Availability of upgrade options

BY MICHAEL L. SULLIVAN-TRAINOR
CW STAFF

For all their differences, personal computers and larger systems share one similarity: the way potential purchasers judge them. This is especially true when buyers are charged with investing in large numbers of PCs for an entire division or firm.

Whether large system or PC, the product that performs best in areas such as reliability, service and support and value receives the highest ratings. Reliability was rated as the most important criterion by 250 PC purchasers surveyed in *Computerworld*'s Buyers' Scorecard survey on popular PC systems from five vendors.

The system that claimed the highest ratings from its users in this category was Hewlett-Packard Co.'s Vectra 386 line of PCs. Vectra garnered the highest satisfaction ratings overall, giving it a slight edge over Compaq Computer Corp.'s Deskpro 386 and IBM's Personal System/2 Intel Corp. 80386-based models. Rated fourth overall was Apple Computer, Inc.'s Macintosh II family, while AT&T's 6386 line placed fifth.

Buyers at large installations within Fortune 1,000 companies rated only the family of PCs they are currently using. Fifty respondents were surveyed for each product family. Overall scores were derived by multiplying the ratings each respondent group gave its own product family by the importance factors all users assigned to the criteria (see methodology next page).

Vectra also topped the service and value categories, which were seventh and eighth in importance to users who ranked 17 criteria.

When attention turned to technical performance, however, it was Compaq's turn to shine. Compaq users gave the Deskpro the highest rating in three out of the six key ratings: overall performance, hardware compatibility and applications availability. The Deskpro also rated highest in processor and video speed.

IBM's PS/2 came out ahead in a mix of categories, including compatibility with current software, ease of maintenance and ability to configure.

The Macintosh II series rated above its competitors in ease of use and documentation quality. Apple users also gave it a slight edge in availability of upgrade options. But last-place finishes in compatibility, service and availability of software categories lowered its ratings overall.

AT&T's systems finished last in eight of the 17 areas but mustered third-place finishes in software availability and responsiveness of vendor service.

The results are consistent with the market positions of each system. AT&T is a relative newcomer to the 386-based commercial PC arena, while IBM and Compaq have been battling in a near-even contest for some time.

HP has made it a practice to emphasize service, support and reliability even when its PCs are sold through indirect channels.

The thorn in Apple's side has been a lack of software compared with the vast array of IBM Personal Computer-compatible software, and indirect sales make service and support difficult. •

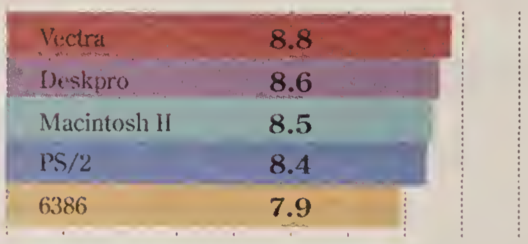
KEY RATINGS

HP's Vectra users give it the highest ratings in five categories as well as reliability – the most important criterion to all users surveyed – but Compaq's Deskpro wins top accolades for overall performance, hardware compatibility and availability of application software categories

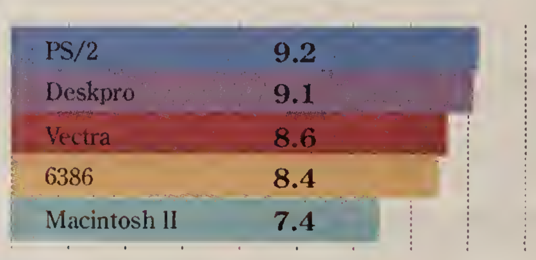
(Ratings are rounded to one decimal place)

User importance rating:

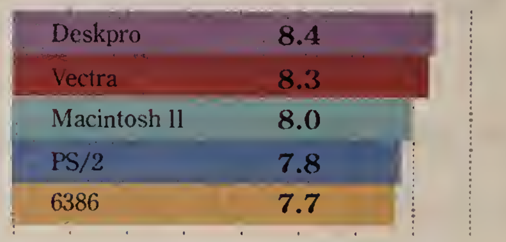
9.2 Reliability



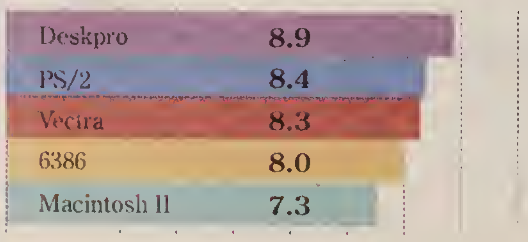
8.9 Compatibility with current software



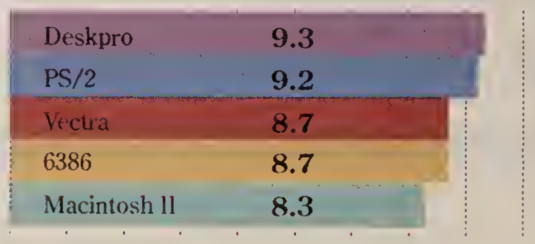
8.8 Quality of overall performance



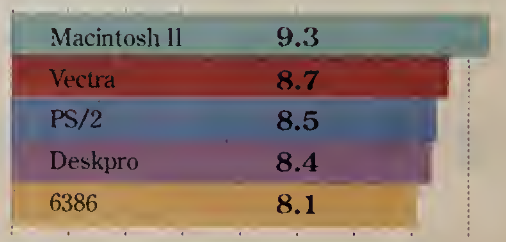
8.6 Compatibility with installed hardware



8.6 Availability of application software



8.5 Ease of use



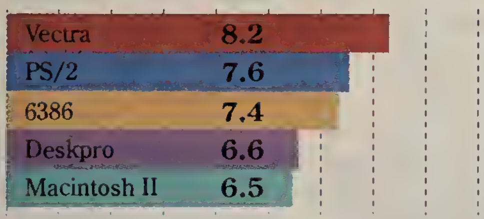
CW Charts: Paul Mock

A CLOSER LOOK

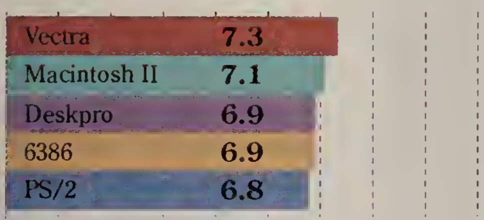
IBM's PS/2 ties with HP's Vectra for ease of maintenance and ability to configure. Apple's Macintosh II tops ease of installation and quality of documentation categories. AT&T's 6386 captures second in effective disk speed, but places last in 5 of 11 categories

User importance rating:

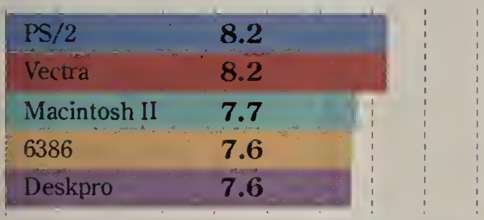
8.3 Responsiveness of vendor service



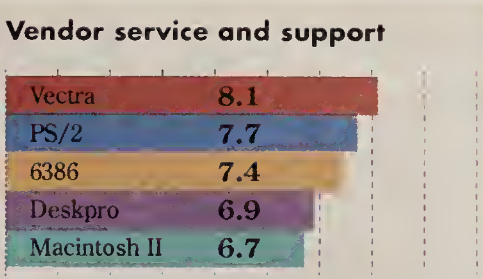
8.3 Value for the dollar



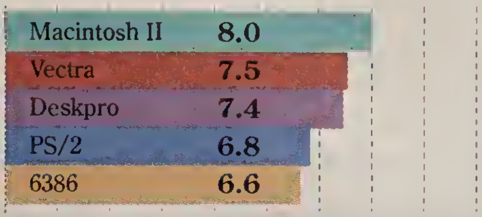
8.3 Ease of maintenance



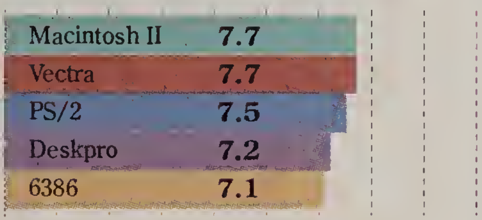
8.2 Vendor service and support



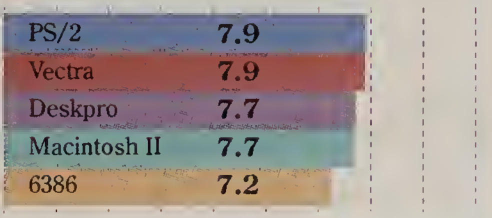
8.0 Quality of documentation



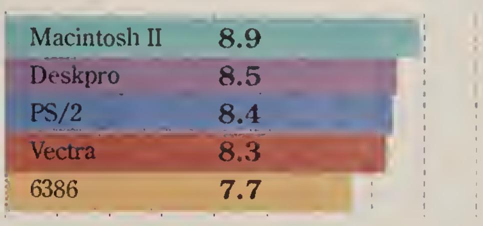
7.7 Availability of upgrade options



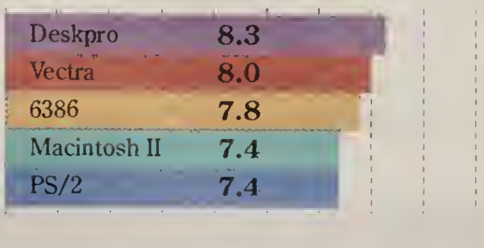
7.6 Ability to configure



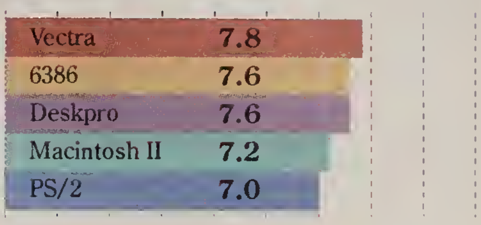
7.5 Ease of installation



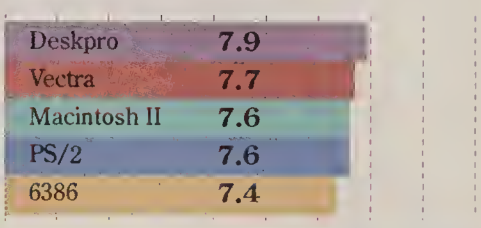
7.4 Effective processor speed



7.4 Effective disk speed



7.4 Effective video speed



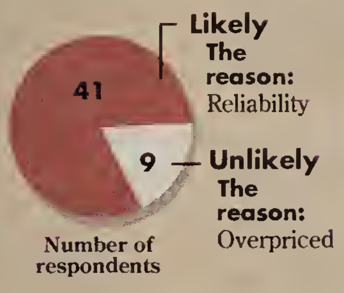
Loyalties

Would you buy the product again?

(Reasons based on most frequently stated responses)

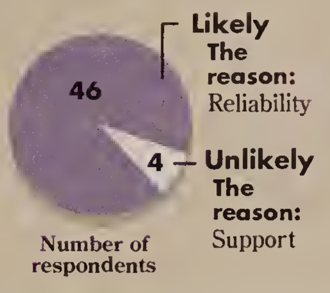
Vectra

Response base: 50



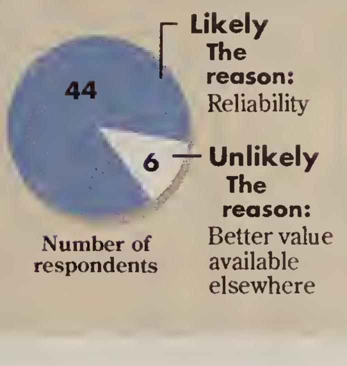
Deskpro

Response base: 50



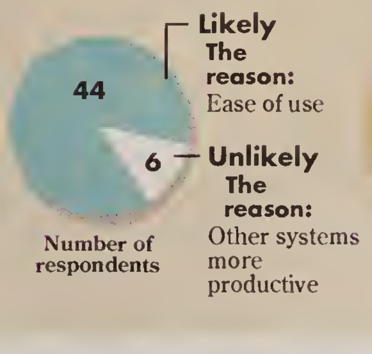
PS/2

Response base: 50



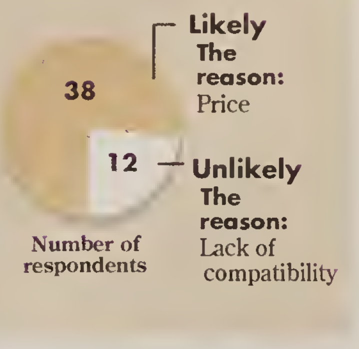
Macintosh II

Response base: 50



6386

Response base: 50



Verbatim

What do you like best/least about this product?

(Responses are based on most frequently stated answer)

Vectra

Likes

Reliability
Quality
Speed

Dislikes

Price
Hard drives
Service and support

Deskpro

Likes

Reliability
Speed
Compatibility with hardware/software

Dislikes

Price
Lack of compatibility with other systems
Service and support

PS/2

Likes

Reliability
Compatibility with hardware/software
IBM reputation

Dislikes

Price
Lack of expansion slots
Slow

Macintosh II

Likes

Ease of use
Graphical interface
Ability to interface with LANs and printers

Dislikes

Price
Lack of compatibility with IBM products
Slow processor

6386

Likes

Reliability
Speed
Price/performance

Dislikes

Breakdowns/downtime
Limited compatibility with other hardware/software
Documentation

METHODOLOGY

Products rated in *Computerworld*'s Buyers' Scorecard on personal computers were selected in the following manner: The products had to be from one of the five leading PC vendors in the commercial Fortune 1,000 marketplace, based on installation base and revenue.

Within that sample, they also had to be the largest capacity, most widely installed systems that were comparable in terms of size and capabilities.

The following made up the installed market share of the top five vendors at Fortune 1,000 sites: IBM — 60.6%, Compaq Computer Corp. — 8.4%, Apple Computer, Inc. — 6.7%, AT&T — 3.1% and Hewlett-Packard Co. — 2.4%, according to Computer Intelligence in La Jolla, Calif.

The survey was done by telephone interviews conducted by First Market Research in Austin, Texas, using names selected randomly from non-vendor sources. A minimum of 50 users was required for each product set.

Total weighted scores were computed by multiplying the mean scores that users assigned to the importance of each criterion by the mean scores each user group gave its own product.

RESPONDENT PROFILE

Most of the 250 respondents (44%) purchase their PCs through dealers. One quarter purchase the bulk of their PCs directly from the vendor, and another 20% buy either through a value-added reseller or retailers.

Seventy-four percent of the respondents buy the majority of their applications off the shelf, and the remainder develop their own customized applications.

The respondents say that an average of 40% of their PCs are connected to local-area networks. They say that percentage will grow to 66% in the near future.

In addition, 46% of the respondents have moved mission-critical applications from larger systems to PCs and PC networks.

ACKNOWLEDGEMENTS

Computerworld would like to acknowledge the assistance provided by the following individuals and organizations in the preparation of this edition of Buyers' Scorecard: Dan Ness, Computer Intelligence; Dataquest, Inc.; Bruce Stephen, International Data Corp.; and Tom Wilmott, Aberdeen Group.

There are some pitfalls to avoid on used route

BY ALEX RANDALL

If you are about to plunk down $10,000 for the computer of your dreams, shouldn't you consider an option that could almost halve that figure?

That option is one that purchasers are only now starting to take seriously: the used computer. With hundreds of rungs on the computing ladder, from toys to supercomputers, the chances are fairly good that the system of your dreams is someone else's throwaway — and an inexpensive one at that.

As soon as the wrappings are undone, the dealer's premium over the manufacturer's price evaporates, thus reducing the computer's value by 40% of its purchase price.

There are no guarantees on the used route, of course; you could drop a lot of cash and end up with a lemon. In addition, corporate buyers accustomed to purchasing new equipment will need to stay flexible to shift with the new business ground rules. The key is to educate yourself before entering the used computer market. Here are some dos and don'ts:

- **Know what you want before you shop.** The variety of machines found in the new computer market is amplified a hundredfold in the used market.

Not only are all the new models available at used discounts, but also all manner of former hits, discontinued models and relics of earlier eras. With all the choices, it is best to have a specific system and configuration in mind.

- **Thoroughly research the available channels before making a purchase.** Used computer buyers are frequently guilty of insufficient research. If you think a quick perusal of the newspaper want ads is enough to find a great deal, you may throw away a lot of money on the wrong system. Buying a computer is about consuming information. It is smart to check a variety of sources — stores, trade-in centers and computer brokers — before making a purchase.

In general, the newspaper seller is to be avoided. For one thing, you will have to handle all the details of the deal, leaving yourself open for the "busted-box rip-off."

Used computer brokers or used computer stores are safer routes. A professional broker will hold your funds in escrow until the system is in your hands and has been tested.

- **Pay attention to pricing.** Prices of used computers vary widely, but there are a few purchasing guidelines to follow. In general, brand-name computers from the standard-setters hold their resale value better than inexpensive clones, and fully configured systems are valued higher than machines that are off-standard.

There is also an active worldwide used computer market, and — like stocks and commodities — there is a "fair market price." The Boston Computer Exchange, Exsel, Inc. in Rochester, N.Y., Century Computer Brokers in California and the National Liquidators Association all currently offer indexes that provide a yardstick of what consumers should be paying for various models.

- **Consider getting an appraisal on the system.** Staying on top of prices can be a full-time job, so another route is to get an appraisal from a professional. An appraiser can also get you a firm idea of the value of your current equipment as well, making it easier to decide whether to keep or sell what you own.

- **Test equipment before you commit funds.** Before you buy, you need to make sure that the system will operate correctly. Unscrupulous sellers will try to sell systems that never worked or gear that they broke.

A test upon arrival is worth more than a 30-day warranty. Warranties are actually not worth very much in the used computer business. Most computer equipment that works on arrival will operate without a problem for many months more than the warranty covers.

Moreover, most warranties on used gear are depot warranties that amplify the downtime of a failing machine.

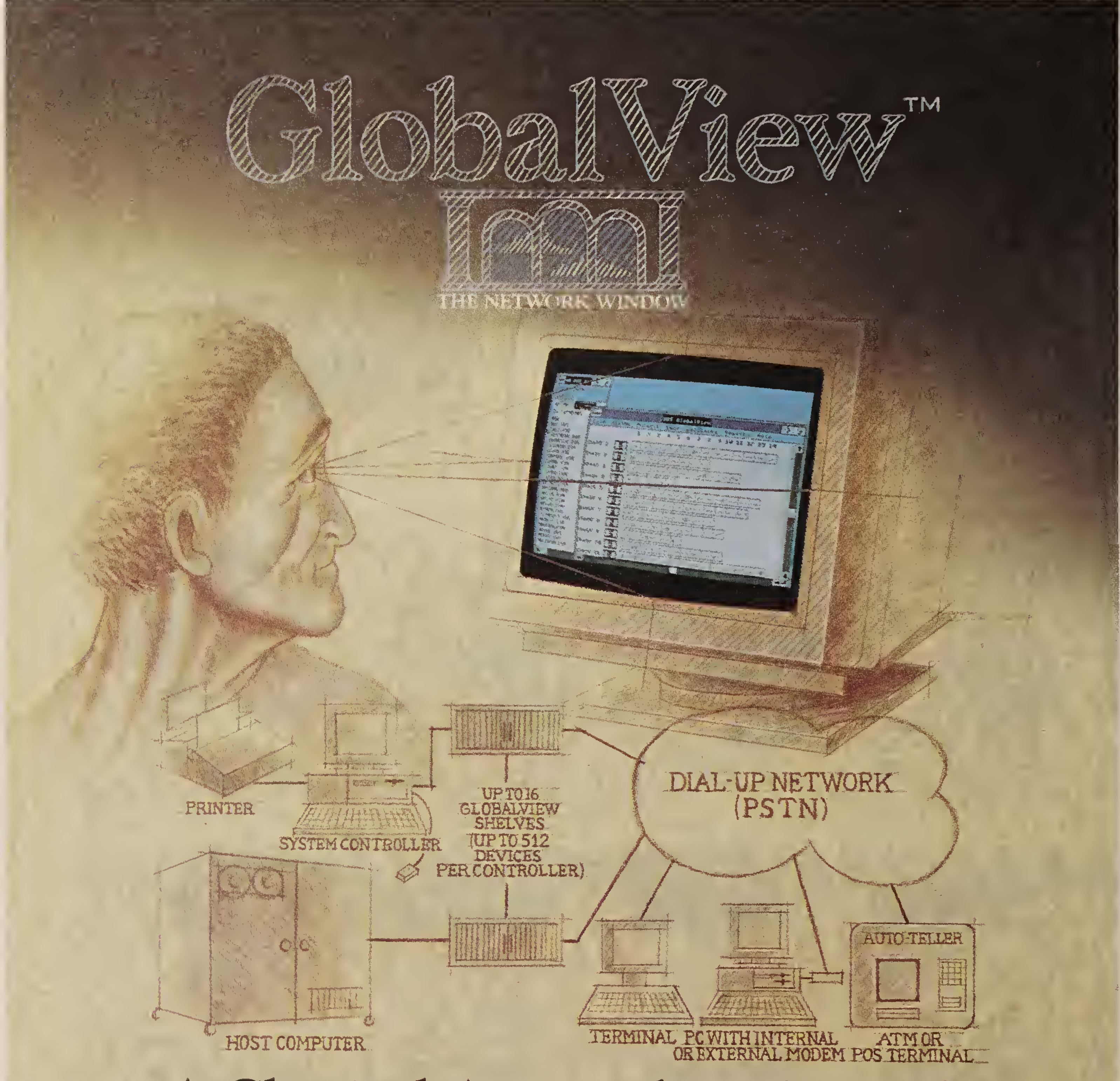
As a final fallback route, make sure that an inoperative system can be returned.

- **Inquire about the computer's former owner.** Avoid buying a system that's been used in a smoke-filled environment or an industrial setting. Dust and smoke are hard on computers, and if the system was not ruggedized, it may well have been damaged by the exposure. The same is true for computers that have been used in high temperatures or damp areas.

- **Don't buy outmoded equipment.** Avoid systems that are no longer attracting software developers' interest. Antiques from the early 1970s with old operating systems can be purchased for petty cash, but there are few new pieces of software for really old machines. You have not saved any money if you buy an over-the-hill system.

Continued on page 107

Randall is the author of *Alex Randall's Used Computer Handbook* and the president of the Boston Computer Exchange.



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The advantages of powerful, sophisticated network control systems, while available to managers of large leased-line networks, have been denied to dial-up network users. GlobalView ends that disparity.

Now you can monitor, configure and control as many as 512 local datacomm devices and any number of remote devices from a single location. You may control network security parameters, trace problems to individual devices and oversee resource allocation. Real-time and historical reports are available via color monitor, with hard copy generated for later analysis.

GlobalView is comprised of Microsoft® Windows-based software, an evolving variety of modems and other datacomm devices and a compact (7"×19") equipment rack for use with your 80286-based PC controller.

GlobalView is the classical solution to contemporary network management problems. For specifications, pricing and applications assistance, contact UDS, 5000 Bradford Drive, Huntsville, AL 35805-1993. Telephone 205/430-8000; FAX 205/430-8926.

UDS
MOTOROLA

Created by Dayner/Hall, Inc., Winter Park, Florida

Continued from page 106

- **Try to get extra software and peripherals in the deal.** Ask the seller what particular programs are being sold with the machine. It is common for a seller to include software and peripherals while charging only the value of the core system. If the fit is a good one, you may get a really good deal on the whole package.

- **Make it legal; get a bill of sale and all copies of any software.** Make sure that you legally transfer the software licenses with the computer. The old owner should deliver *all* copies of the software as well as the originals. The new owner should write to the licensors and inform them of the license transfer. Not only is this legally correct, but it allows the software maker to update the new owner with the latest releases.

- **Keep redundant machines for backup.** If your used computer is performing a critical task, then maintain redundant systems and keep a service contract on them for the long term.

- **Keep in mind the resale.** Computers are like baby clothes: You outgrow them before they wear out. In order to keep resale value high, purchase quality goods with well-known brand names that will hold their value.

In addition, keep all the boxes, pieces and manuals that came with the machine. When it's your turn to sell the system, the next owner will likely pay more for a complete system than one that's missing all the details. •

ASK THE VENDOR

I use two microcomputer add-in boards — the AT-Super for Personal Computer AT compatibles and the Nusuper for Macintosh IIs — to develop applications such as a Postscript-like interpreter and a color separater.

How fast can I expect print throughput to be? What would be the average number of text pages and average number of graphics pages per minute?

Patrick Wood
Vice-President of R&D
Pipeline Associates, Inc.
Morris Plains, N.J.

YARC SYSTEMS CORP.: The speed depends on the application. Our fastest implementation of a Postscript-compatible interpreter can run 10 to 40 times quicker than an MC68020 Apple Laserwriter NTX.

In addition, multiple Yarc coprocessor systems may be placed on the bus of your microcomputer, enabling multiple Postscript interpretation jobs to run at the same time, thus further increasing throughput. This would be useful, for example, for a PC network printer server controlling a departmental laser printer.

I'm using the Mach^2 personal computer controller board, which is an accelerator board coupled with a tape drive and software. Is there any way I can save files directly to the tape drive without having to go through your software?

Hermine Krysa
System Manager —
Data Processing
Wright City College
Chicago, Ill.

MOUNTAIN COMPUTER, INC.: This is not possible with the current software application. The Mach^2 controller and its software are what allow the high-speed data transfer rates for Mountain's File Safe 8000 Plus.

The Mach^2 works with the File Safe tape software application to format the data mini-cartridges on the fly, as data is written. With other mini-cartridge tape drives, the tapes must be formatted before they can be used.

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Kodak optical storage libraries can store more data, more quickly, in less space, at less cost than any other comparable system.

With the KODAK Automated Disk Library, Model 560, you can store 4,000 2-drawer file cabinets (up to 75 gigabytes of information), in the space of one. It accepts both WORM and erasable drives, and fits under a table. For centralized systems, the Kodak 6800 library stores more information than 16,000 4-drawer file cabinets (over a terabyte of information), and lets you find any file in 6.5 seconds. That means better, quicker decision making and happier customers.

Whether you are in banking, insurance, engineering or medicine, find out how Kodak optical storage libraries can be integrated to meet your requirements. For a complete package of product information and knowledgeable follow-up, call: 1 800 445-6325. Ext. 993B.
So much data, so little time.

STORE THOUSANDS OF FILE CABINETS IN ONE.

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The new vision of Kodak

Kodak

PC purchases: Much more than just buying a box

FIRST PERSON

BY JACQUELINE A. BYNSDORP

One of the biggest lessons I have learned as a personal computer coordinator at Jockey International, Inc. is that to treat any request for a new PC as a simple purchase decision would be to shortchange the user, the department and the organization.

Bynsdorp is personal computer coordinator at Jockey International, Inc., an apparel firm in Kenosha, Wis.

There are 200 PCs at my firm, including machines from IBM, Compaq Computer Corp., ITT and various clone makers, as well as Toshibas and NEC portables. These are typically used by one or several people within a department.

When someone requests a new PC, I interview each person who would use the new equipment to find out what they expect to gain from the machine.

During these interviews I also analyze the business problem at hand. If it seems to be addressable via a hardware/software solution on existing PCs, I verify this by examining machines in the department for a variety of things.

First, I determine whether there is available time. Installed on each PC is a usage tracking utility, which I use to run a report indicating the amount of time used for each application.

I also check the amount of hard disk space available by running CHKDSK.

I calculate the amount of hard disk I'll need by checking the hardware specification sheets and then estimating the additional space I'll need for data by looking at similar applications already in use. By examining existing configurations, I can determine whether the new use can be incorporated in an existing unit.

I also keep a fully configured unit in stock as a replacement unit. If I determine that a PC cannot be justified, or if there isn't enough time on existing computers, this PC can be used.

After conducting the interviews, I either install canned software packages, additional hardware or both or put together a new configuration list.

With turnkey systems, the contractor often supplies the hardware and software. Keep in mind, however, that if the vendor supplies hardware support, the price will be higher. This is money well spent, although the vendor may object to the PC being used for other purposes.

When purchasing a turnkey system, hardware requirements must be checked thoroughly — looking beyond spec sheets. I always discuss worst-case scenarios with my technical representative and contact businesses with similar installations, taking advantage of their experience and knowledge.

If installation needs are not met, the end result could be a potential upgrade and lost time.

When purchasing hardware, I refer to a spreadsheet that I maintain, stating prices of supported hardware and listing various vendors. I also maintain a list of specials offered by the manufacturer to keep me informed of where the largest quantity discount is available.

If time frames on the specials coordinate with a purchase need, I may purchase several PCs, buying only the basics on the extras, so that they can be upgraded when specific requirements are clear.

Looking ahead

When making the purchase decision, a couple of key factors come into play, above and beyond the users' needs. These include future expansion, compatibility with existing systems and establishing corporate standards for hardware and software.

When buying strategies are defined, equipment interchange is easier, service disruptions are minimized, and opportunities for quantity discounts are maximized.

Sticking as much as possible to one brand of PC makes coordination and upgrading easier.

However, all our PCs are not from the same manufacturer. I base the decision of which vendor to use on price, necessary technical support and service reputation, when applicable.

I also need to ensure that purchases align with the technical skills and existing systems within our current computer operation. For example, if a proposed PC is needed to access data in the host computer, I must coordinate this with operations. I therefore purchase emulation boards of the same manufacturer type as the mainframe, PC and PC support to the mainframe, allowing better support.

Even if a PC being installed in a user's area does not require emulation, that need may change. Consequentially, purchasing consistent PC brands allows for configuration changes as necessary.

It is very important to be familiar with hardware and corporate-standard software throughout the company.

Just because I decide to make a purchase does not mean it will be justified by the finance department. With budgeting constraints, it can be difficult for me to justify the need for an extra expenditure.

If the PC being considered is the first

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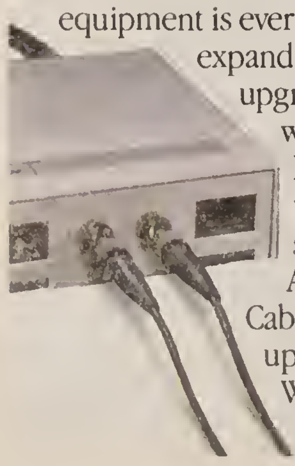

Continued from page 108

system in a department, it is a good idea to develop an application to verify justification. This also familiarizes someone within the department with the new computer.

Sometimes, no matter how much I would like a particular application, I just can't justify it. For instance, I am currently looking at desktop publishing. However, the desired hardware/software combination does not fall into my list of corporate standard equipment.

When it comes to deciding between an upgrade and a new system purchase, I need to weigh a couple of factors. For instance, if I am installing a unit with a low-end configuration requirement — such as an Intel Corp. 8088-based system running at 8 MHz with a 20M-byte hard disk and no graphics — I could simply take an old IBM Personal Computer XT out of storage. However, if the PC will serve a critical function, I'd rather install a new unit, because the machine may someday need to be integrated with other systems.

I HAVE PURCHASED units from all sources: dealer, retailer and mail-order, with the latter offering the best pricing for quantity purchases.

I determine this by interviewing senior department representatives and evaluating the source of input, the complexity of the data manipulation and the distribution of the output.

Keep in mind that support for older units is often more difficult to obtain, even with service contracts. Accelerator boards and other methods of upgrading are not appealing to me, since upgrade costs are high compared with the decreasing costs of new technology.

At times, I need to make quantity purchases, such as when we automated our sales force. In that case, I put a project out for bid.

I prefer to see several manufacturers' models at the same time and test read/write speeds, features and available options. Vendors are usually happy to accommodate this type of request.

I have purchased units from all sources: dealer, retailer and mail order, with the latter offering the best pricing for quantity purchases.

Participating in manufacturers' warranty programs and having a national service contract, these types of purchases are cost-effective if there are no configuration issues to satisfy.

However, for more sophisticated configurations, particularly networks requiring addressing of cabling, uninterruptible power supply, a variety of printers and quality-control devices, I am most comfortable working with retailers who offer on-site service and research.

To help with sourcing, I check the spreadsheet mentioned earlier. I am also contacted regularly with updated price lists from various vendors. I offer a limited group of PCs, peripherals and software programs, which allows for better support service.

All of this sounds like a lot of work, but when managed properly, PC operations can be an integral partner in achieving corporate goals. •

If you want a Super VGA, here's how to buy

BY JON PEDDIE

Recalling the adage: "If it ain't broke, don't fix it," some people may wonder why they should opt for Super Video Graphics Array (VGA) when regular VGA has already established itself as the de facto standard in personal computer and workstation displays.

The answer depends on the type of applications you are using, your budget and your technical competence.

In general, popular applications such as spreadsheets, terminal emulation, word processing and database systems can take advantage of higher-resolution displays, but these users typically have small budgets and little technical interest or competence in Super VGA.

Applications more often associated with higher-resolution capabilities are computer-aided design, desktop publishing, desktop presentation and slide generation.

IBM first introduced VGA in 1987. At its highest resolution — 640 by 480 pixels — it displays 16 colors. Its analog output allows a much wider range of colors at lower resolutions as well. For example, VGA can display 256 colors at 640 by 240 pixels.

Clone manufacturers proceeded to play around with the basic design of VGA, increasing memory size and clock rate. Eventually, they extended the resolution to 800 by 600 pixels, and thus was born "Super VGA."

With very few exceptions, almost every company that makes a VGA card (more than 85 at last count) also offers a Super VGA version.

There are differences among them — some offer the lowest possible cost (and minimum features), some have greater speed, some can work with more applications, some are especially well suited for a particular application, some have very high resolution and some are even capable of capturing a television image and displaying it.

You shouldn't choose a VGA card without knowing what application, or applications, you want it for. Users can be defined in the following three categories:

- Amateurs, or those who use an application fewer than three hours per day.
- Professionals, or those who use one or two applications four or more hours per day.
- Power users, or those who may be either an amateur or a profesional but have to have — and can afford — the best or the fastest.

An amateur needs the most flexible, versatile system. If he has to use word processing one moment and then switch to a spreadsheet and then maybe a communications or database program, he usually can't afford to optimize his system for just one of those applications.

In addition, there are few applications that support the Super VGA mode. When a VGA card is turned into a Super VGA by the manufacturer, it no longer has the universality of a generic VGA. Because it has a high-resolution display, a special software program called a driver is needed for each application.

Application developers don't want the burden of writing special interfaces to all the display cards available. They typically offer IBM's Enhanced Graphics Adapter (EGA), Hercules, VGA and one or two special products such as IBM's 8514/A.

To get a Super VGA card to work with an application, the card manufacturer has to write the driver. However, even though a Super VGA card manufacturer may offer a driver for your favorite application, it may not be for the version you want to use.

So, when considering a Super VGA, the first thing you have to do is find out if the card you are interested in comes with a driver for your applications.

The physical size of your characters is something else that will change with a Super VGA card. As resolution goes up, the physical size of the pixels on the screen goes down.

Therefore, if a character in seven- by nine-pixel resolution looks good on a standard 14-in. VGA screen, that same character will be 40% smaller at 1,024- by 768-pixel resolution and 20% smaller at 800- by 600-pixel resolution.

Another cost factor is the monitor. If you have an EGA display now and want to move up to a Super VGA display, you are going to also have to buy a new monitor.

If you have a fixed-frequency VGA monitor and want to use a Super VGA card, you will still need to get a high scan-rate monitor. This is one of the reasons the multisynchronous monitors have been so popular.

If you're trying to get a lower cost Super VGA, you can play around with the different refresh rates. Refresh rate is the speed at which the screen is updated, and the higher the refresh rate, the greater the cost of the monitor.

You can also choose between interlaced and noninterlaced. If every other line of the screen is refreshed every other screen update, it is interlaced, like a TV.

A 30-Hz interlaced monitor will cost a lot less than a 60-Hz noninterlaced one.

And then there is Extended VGA, which the vendors can achieve by adding additional memory (up to 1M byte). These cards offer 256 colors at 1,024- by 768-pixel noninterlaced mode. •

Peddie is president of Jon Peddie Associates, a consulting firm in Oakland, Calif.

Top-selling VGA boards

	Genoa Systems Super VGA	Groundhog Graphics Shadow	Paradise Systems 1024	Video Seven VRAM	Hercules VGA Card
Displayable colors at a resolution of:					
640 x 480	256	256	256	256	16
800 x 600	256	256	256	256	NA
1,024 x 768	16	256	16	16	NA
VGA chip used	Genoa	Tseng 4000	WD90C11	LIA4199	Chips & Technologies
Memory on card (bytes)	512K	1M	512K	1M	128K
Refresh rate available*	30I to 70NI	60NI	56NI to 72NI	60NI	60NI

I stands for interlaced; NI stands for noninterlaced

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Here is a brief description of some of the AT&T components that can help you design the best wiring system to serve you now and in the future. For more information, send in the coupon below, or call 1-800-344-0223, ext. 5230.

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Entry-level commercial workstations

VENDOR PHONE	WORKSTATION	COMPARABLE SYSTEMS	TYPE OF PROCESSOR	OPERATING SYSTEMS SUPPORTED	CLOCK SPEED (MHz)	PERFORMANCE IN MIPS[1]	PERFORMANCE IN MFLOPS[2]	CACHE (BYTES)	PORTS	MEMORY RANGE (BYTES)	MAXIMUM DISK CAPACITY (BYTES)	SCREEN SIZE	COLOR OR MONOCHROME MONITOR (INCHES)	GRAPHICS CAPABILITIES	SUPPORTS ETHERNET OR TOKEN-RING	NETWORK PROTOCOLS SUPPORTED	PRICE
Compuadd Corp. (800) 688-6380	Compuadd SS1	Sun Sparcstation 1+	Sparc (proprietary)	Sun OS 4.1	20	12.5	3 - 5 single precision; 1.4 double precision	64K	Two serial	8M - 64M	1.3G	19	Monochrome	3D	Ethernet	NFS,TCP/IP	$5,995+
Data General Corp. (800) 328-2436	Aviion AV100	Sun Sparcstation SLC	Motorola 88000	DG/UX	16.7	17	2.25 single precision; 1.27 double precision	16K	Two serial	8M - 16M	4G	20	Monochrome	2D	Ethernet	BSC, HDLC, SDLC, HASP, OSI, NFS, SNA, TCP/IP, X.25	$3,995+
	Aviion AV200	Sun Sparcstation SLC	Motorola 88000	DG/UX	16.7	17	2.25 single precision; 1.27 double precision	16K	Two serial	8M - 28M	4G	20	Monochrome	2D	Ethernet	BSC, HDLC, SDLC, HASP, OSI, NFS, SNA, TCP/IP, X.25	$5,950+
	Aviion AV300, AV310	Decstation 3100, Sun Sparcstation 1+	Motorola 88000	DG/UX	16.7 for Model 300; 20 for Model 310	17 for Model 300; 20 for Model 310	2.25 single precision and 1.27 double precision for Model 300; 2.7 single precision and 1.5 double precision for Model 310	16K	One serial, one parallel	8M - 28M	4G	19 or 20	Either	2D	Ethernet	BSC, HDLC, HASP, OSI, NFS, SNA, TCP/IP, X.25	$8,650 - $14,995+
	Aviion AV400 series	Decstation 3100, Sun Sparcstation 1+, IBM RS/6000	Motorola 88000	DG/UX	16.7 - 20	17 - 40	1.8 - 2.17 single precision; 1.06 - 1.27 double precision	16K	Two serial, one parallel	8M - 32M	4G	19	Color	2D, 3D	Ethernet	BSC, HDLC, SDLC, HASP, X.21, NFS, SNA, TCP/IP, X.25	$14,995+
Digital Equipment Corp. (800) 344-4825	Decstation 2100	Sun, Sparcstation SLC, HP Apollo 9000 Series 400	MIPS	Ultrix	12.5	11	2.8 single precision; 1.2 double precision	128K	One SCSI	8M - 24M	4.4G	15, 16 or 19	Monochrome	2D, 3D	Ethernet	NFS, Decnet, TCP/IP	$4,995
	Decstation 3100	Sun Sparcstation IPC, HP Apollo 9000 Series 400	MIPS	Ultrix	16.7	15	4.0 single precision; 1.6 double precision	128K	One SCSI	8M - 24M	4.4G	15, 16 or 19	Monochrome	2D, 3D	Ethernet	NFS, Decnet, TCP/IP	$6,995
	Vaxstation 3100 Model 76[4]	NP	CMOS VAX	VMS	28 nsec	2.8 VUPs[5]	6.4 single precision; 3.7 double precision	128K	One SCSI	8M - 32M	21G	19	Either	2D, 3D	Ethernet	NFS, Decnet, TCP/IP	$11,950
Hewlett-Packard Co. (800) 752-0900	HP Apollo 9000 Series 400 Models 400t and 400s	Sun Sparcstation 1+, Decstation 2100 and 3100	Motorola 68030	HP-UX, Domain OS	50	12	0.5 single and double precision	256K internal; 32K external	Five	8M - 32M for Model 400t; 8M - 128M for Model 400s	1.3G	16 or 19	Either	2D, 3D	Ethernet, Token-Ring	OSI, SNA, TCP/IP, X.25, RJE	$6,990 - $22,990 for Model 400t; $11,990 - $20,000 for Model 400s
	HP Apollo 9000 Series 400 Model 400dl	Sun Sparcstation SLC	Motorola 68030	HP-UX, Domain OS	50	12	0.5 single and double precision	256K internal; 32K external	None	8M - 16M	1.3G	16 or 19	Either	2D, 3D	Ethernet, Token-Ring	OSI, SNA, TCP/IP, X.25, RJE	$4,990 - $8,990
	HP Apollo 9000 Series 400 Model 425t	Sun Sparcstation IPC, Decstation 3100, IBM RS/6000 Powerstation 320	Motorola 68040	HP-UX, Domain OS	25	20	3.5 single and double precision	4K internal	Five	8M - 64M	400M	16 or 19	Either	2D, 3D	Ethernet, Token-Ring	OSI, SNA, TCP/IP, X.25, RJE	$8,990 - $24,990, based on 68030-based model plus $2,000 upgrade
	HP Apollo 9000 Series 400 Model 433s	Sun Sparcstation, Decstation 5000, IBM RS/6000 Model 520	Motorola 68040	HP-UX, Domain OS	33	26	4.5 single and double precision	4K internal	Up to five	8M - 128M	1.3G	16 or 19	Either	2D, 3D	Ethernet, Token-Ring	OSI, SNA, TCP/IP, X.25, RJE	$13,990 - $25,000, based on 68030-based model plus $2,000 upgrade
IBM (800) 426-3333	RISC System/6000 Powerstation 320	Sun Sparcstation IPC and 1+, HP Apollo 9000 Series 400	IBM RISC	AIX 3.0	20	29.5	8.5 double precision	8K instruction; 32K data	Two serial, one parallel printer	8M - 32M	640M	19	Either	2D, 3D	Ethernet, Token-Ring	BSC, SDLC, NFS, SNA, Decnet, TCP/IP, X.25, NCS	$12,995 - $33,065
Mars Microsystems (412) 934-1040	Mariner 4i	Sun Sparcstation 1+	Sparc	DOS, Unix	25	16.8	1.8 single precision	64K	Four	8M - 96M	2G	17 or 19	Either	2D	Ethernet, Token-Ring	BSC, HDLC, SDLC, NFS, TCP/IP	$5,995 - $11,995
Mips Computer Systems, Inc. (408) 720-1700	Magnum 3000	Sun Sparcstation 1+, IBM RS/6000 Model 320	MIPS	RISC/OS (Unix-like)	25	17.9 specmarks[3] (25 MIPS)	6.0 single precision, 3.6 double precision	64K	2 - 34	8M - 128M	6G	16 or 19 color, 17 monochrome	Either	2D, 3D	Ethernet, Token-Ring	HDLC, SDLC, X.21, OSI, NFS, SNA, Decnet, TCP/IP, X.25, X.29, TTY, XNS, Netbios, ONC	$8,900-$26,990

Products listed are single-user, multitasking workstations aimed at the commercial business applications market. Scientific, engineering and graphics workstations were excluded. Most machines use traditional workstation processors, such as the reduced instruction set computing (RISC)-based Mips Computer Systems, Inc., Sun Microsystems, Inc. Sparc or Motorola, Inc. 88000 chips. However, the machines listed that are based on Intel Corp. processors, which are not traditional workstation chips, are targeted directly to the workstation market and are comparable in performance levels to workstations.

[1] MIPS = millions of instructions per second.

[2] MFLOPS = full-precision millions of floating-point operations per second.

[3] Specmark = rating given by Spec, an industry consortium, based on teesting a technical application suite.

[4] Specifications on the Digital Equipment Corp. Vaxstation 3100 Model 76 were compiled from both *Computerworld* sources and the vendor.

[5] One VUP (VAX unit of performance) = the performance of the DEC 11/780.

[6] Information on this product was not provided by the vendor, but gathered from other published sources.

The companies included in this chart responded to a recent survey conducted by *Computerworld*. When a vendor is unable to provide specific information about its product, the abbreviation NP (not provided) is used. When a question does not apply to a vendor's product, the abbreviation NA (not applicable) is used. Further product information is available from the vendors.

VENDOR PHONE	WORKSTATION	COMPARABLE SYSTEMS	TYPE OF PROCESSOR	OPERATING SYSTEMS SUPPORTED	CLOCK SPEED (MHz)	PERFORMANCE IN MIPS[1]	PERFORMANCE IN MFLOPS[2]	CACHE (BYTES)	PORTS	MEMORY RANGE (BYTES)	MAXIMUM DISK CAPACITY (BYTES)	SCREEN SIZE	COLOR OR MONOCHROME MONITOR (INCHES)	GRAPHICS CAPABILITIES	SUPPORTS ETHERNET OR TOKEN-RING	NETWORK PROTOCOLS SUPPORTED	PRICE
Mobius Computer Corp. (800) 662-4871	Protege Series PWS/425 MX and 433 MX	DG Aviion, DEC 3100	Intel 80486	Unix System V.3.2	25 or 33	11.1 for Model 425 MX; 16 for Model 433 MX	1.21 single precision, 1.03 double precision for Model 425 MX; 1.35 single precision, 1.21 double precision for Model 433 MX	8K	Two serial, one parallel	4M - 16M	2.4G	15	Monochrome	2D	Ethernet	NFS, TCP/IP, X.25, OSI	$7,695 for Model 425 MX; $8.795 for Model 433 MX
	Protege Series PWS/425 CX and PWS/433 CX	Sun Sparcstation 1+, DEC 3100	Intel 80486	Unix System V.3.2,	25	11 for Model 425CX; 16 for Model 433CX	1.21 single precision, 1.03 double precision for Model 425CX	8K	Two serial, one parallel	4M - 16M	2.4G	16	Color	2D	Ethernet	NFS, TCP/IP, X.25, OSI	$9,695 for Model 425CX; $10,795 for Model 433CX
Next Computer, Inc. (415) 366-0900	Nextstation	Sun Sparcstation	Motorola 68040	MACH	25	15	Two double precision	None	Five	8M - 32M	340M	17	Monochrome	2D	Ethernet	NFS, TCP/IP	$4,995
	Nextcube	Sun Sparcstation 1+	Motorola 68040	MACH	25	15	2.0 double precision	NA	5	8M - 64M	1.4G	17	Monochrome	2D	Ethernet	NFS, TCP/IP	$7,995-$13,290
Opus Systems (408) 446-2110 or (415) 966-4040 (after Nov. 15)	5120 Personal Mainframe	Sun Sparcstation 1+	Sparc	SunOS 4.1	25	18	1.7 double precision	64K	Two serial, one audio	8M - 64M	4G	19	Color	2D	Ethernet	NFS, TCP/IP	$14,495 - $19,495
	8110 Portable Mainframe	IBM RS/6000, Sun Sparcstation 1+, DG Aviion	Motorola 88000	Unix System V.3.2	16.7, 20, 25 or 33	19.5 - 44	1.68 single precision, 1.03 double precision	16K instruction, 16K data	Two	8M - 32M for Model 8110	330M	Monochrome, 11	NA	2D	Ethernet	NFS, TCP/IP, SNA, X.25	$21,995 - $27,000
	8120 and 8130 Personal Mainframes	IBM RS/6000, Sun Sparcstation, DG Aviion	Motorola 88000	Unix System V.3.2	16.7, 20, 25 or 33	19.5 - 44	1.68 single precision, 1.03 double precision	16K instruction, 16K data	Two serial, one parallel	8M - 32M for Model 8120; 8M - 96M for Model 8130	330M	19	Monochrome	2D	Ethernet	NFS, TCP/IP, SNA, X.25	$15,395 - $30,000
	8140 Personal Mainframe	IBM RS/6000, Sun Sparcstation, DG Aviion	Motorola 88000	Unix System V.3.2	25 or 33	32.2 - 44	1.68 single precision, 1.03 double precision	16K instruction, 16K data	Two serial, one parallel	8M - 96M	330M	19	Monochrome	2D	Ethernet	NFS, TCP/IP, SNA, X.25	$20,895 - $32,000
Solbourne Computer, Inc. (800) 356-8765	S4000	Sun Sparcstation 1+, Mars Mariner 4i, Tatung, Decstation 3100	Panasonic MN10501 (Sparc-based)	OS/MP (SunOS-like)	33	25.5	1.7 double precision	8K	Two RS-423A, one audio	8M - 104M	400M	19	Either	2D, 3D	Ethernet	NFS	$8,995 - $40,000
Sony Microsystems Co. (408) 434-6644	Sony News 3710	Sun Sparcstation 1+, IBM RS/6000	MIPS	News-OS (Unix-like)	20	17	2.3 double precision	128K	Two serial, one parallel, one SCSI, one audio	8M - 32M	640M	19	Color	3D	Ethernet	OSI, NFS, TCP/IP, XNS	$6,800 - $18,200
Sun Microsystems, Inc. (415) 336-7700	Sparcstation SLC	HP Apollo, Decstation 2100	Sparc	SunOS, Unix System V	20	8.8 specmarks (12.5 MIPS)	1.2 double precision	64K	Two serial, one SCSI, one audio	8M - 16M	2.7G	17	Monochrome	3D	Ethernet	NFS, TCP/IP	$4,995
	Sparcstation 1+	Decstation 3100, IBM RS/6000 Powerstation Model 320	Sparc	SunOS, Unix System V	25	10 specmarks (15.8 MIPS)	1.7 double precision	64K	Two serial, one SCSI, one audio	8M - 64M	2.7G	17	Monochrome	3D	Ethernet	NFS, TCP/IP	$8,995
	Sparcstation IPC	Decstation 3100 and 2100, HP Apollo 9000 Models 345 and 400	Sparc	SunOS, Unix System V	25	11.8 specmarks (15.8 MIPS)	1.7 double precision	64K	Two serial, one SCSI, one audio	8M - 24M	207M - 2.7G, depending on disk	16	Color	3D	Ethernet	NFS, TCP/IP	$8,995
	Sparstation 2[6]	NP	Sparc	SunOS	40	21 specmarks (28.5 MIPS)	4.2	16M	NP	Up to 207M	7.6G	19	Monochrome	NP	NP	NP	$14,995
Tatung Science & Technology, Inc. (408) 435-0140	TWS 5020	Sun Sparcstation 1+	Sparc	Sparc OS 1.0 (SunOS-like)	20	12.5	1.4 single precision	64K	Three SBUS, slots, two serial, one mouse, one Ethernet, one SCSI, one audio	8M - 64M	414M	19	Color	2D, 3D	Ethernet	NFS, TCP/IP	$6,995
Unisys Corp. (215) 986-4011	U6000/WS	Sun Sparcstation, Decstation 2100 and 3100, IBM RS/6000	Intel 80386 or 80486	Unisys System V (Unix-like)	33 or 25	11 or 20	1.0 single precision; 1.4 double precision	64K for 386 model; 8K for 486 model	3	8M - 16M for 386 model; 8M - 32M for 486 model	1.3G	20	Color	2D	Ethernet	BSC, HDLC, SDLC, X.21, X.25, OSI, NFS, SNA, Decnet, TCP/IP, RJE	$10,995-$16,495

PRODUCT SPOTLIGHT

Intel-based accelerator boards

VENDOR	PRODUCT	ON-BOARD MICROPROCESSOR	PROCESSOR SPEED (MHz)	MACHINES UPGRADED	OPERATING SYSTEMS SUPPORTED	SYSTEM MEMORY INCLUDED/ EXPANDABLE TO (BYTES)	CACHE SIZE (BYTES)	CACHE ACCESS SPEED (NSEC)	PERFORMANCE BENCHMARKS[1]	BUS SIZE	SOFTWARE INCLUDED	SIZE OF BOARD	REPLACEMENT OR COPROCESSOR	LENGTH OF TRIAL PERIOD	LENGTH OF WARRANTY	PRICE
Aox, Inc. **(800) 232-1269** **(617) 890-4402**	Micro Master 386	386	20, 25 or 33	IBM PS/2 Models 50, 50Z, 55, 60, 65	DOS, OS/2, SCO Xenix, AIX	8M/Uses system memory	20- and 25-MHz boards bave 8K; 33-MHz bas 32K	15 - 35	Landmark speed: 14.5 - 18.3; Norton SI: 23.4 - 29.3	16 or 32 bit	Disk caching, installation	Full	Coprocessor	14 days	1 year	$1,495 for 20-MHz version; $1,795 for 25-MHz; $2,495 for 33-MHz
	Micro Master 486	486	25	IBM PS/2 Models 50, 50Z, 55, 60, 65, 70, 80	DOS, OS/2, SCO Xenix, AIX	8M/Uses system memory	128K	15 - 35	NP	16 or 32 bit	Disk caching, installation	Full	Coprocessor	14 days	1 year	$4,695
Applied Reasoning Corp. **(617) 492-0700**	PC-Elevator 386	386	16	8088, 8086, 80286 IBM PC and compatibles	DOS	1M/16M	None	NA	Norton SI: 18.7; 3.5 MIPS	32	Diagnostic, disk caching, installation, RAM disk	Full	Coprocessor	15 days	1 year	$1,295
AST Research, Inc. **(714) 727-4141**	AST Fastboard/386	386	16	AST Premium/286, AST Fastslot	Any that run on IBM PC	1M/8M	64K	35	NP	32 bit	Diagnostic, installation, expanded memory manager	Full	Coprocessor	None	1 year	$995
	AST Fastboard 386/25	386	25	AST Premium 386 SX/16, AST Cupid	Any that run on IBM PC	4M/Not expandable	32K	25	NP	32 bit	Diagnostic, disk caching, installation, print spooling, RAM disk	Full	Replacement	None	1 year	$1,995 - $2,395
	AST Fastboard 386/33	386	33	AST Premium 386 SX/16, 386/25, AST Cupid	Any that run on IBM PC	4M/Not expandable	32K	25	NP	32 bit	Diagnostic, disk caching, installation, print spooling, RAM disk	Full	Replacement	None	1 year	$1,495 - $3,395
	AST Fastboard 486/25	486	25	AST Premium 386 SX/16, 386/33, 386/25, AST Cupid	Any that run on IBM PC	4M/16M	8K	25	NP	32 bit	Diagnostic, disk caching, installation, print spooling, RAM disk	Full	Replacement	None	1 year	$2,495 - $4,895
	AST Fastboard 486/33	486	33	AST Premium 386 SX/16, 386/33, 386/25, 486/25, AST Cupid	Any that run on IBM PC	4M/16M	8K	25	NP	32 bit	Diagnostic, disk caching, installation, print spooling, RAM disk	Full	Replacement	None	1 year	$3,395 - $6,395
CMS Enhancements, Inc. **(714) 222-6000**	Fast-Trak 286	286	8 or 12	IBM PC XT and compatibles	Any that run on IBM PC XT and compatibles	Uses system memory	8K	NP	NP	8 bit	Installation	Half	Coprocessor	Depends on dealer	1 year	$299
Intel Corp., PC Enhancements Div. **(800) 538-3373** **(503) 629-7000**	Inboard 386/PC	386	16	8088-based IBM PC XT and compatibles	DOS	1M/5M	None	NA	Norton Sl version 4.0: 16.6	8 bit	Disk caching, installation, memory manager	Full	Replacement	None	5 years	$795
Micro Way, Inc. **(508) 746-7341**	Super Cache-286	286	12	80286-based IBM PC and compatibles	DOS	Uses system memory	32K	55	268 single precision kilowhetstone	8 bit	Diagnostic, disk caching, print spooling, RAM disk	Half	Coprocessor	30 days	1 year	$349
	Number Smasher-386	386	20 or 25	Same as above	DOS, Unix, Xenix, OS/2	None/8M	64K (optional)	25 or 35	7,692 single precision dhrystone; 5,378 single precision kilowhetstone	16 bit	Diagnostic, installation	Full	Replacement	30 days	1 year	$895
	Number Smasher-860	I860	33 or 40	80286-, 80386-, 80486-based IBM PC and compatibles	DOS, Unix, Xenix, Sun OS	8M/32M	None	NA	4.2 double precision MFLOPS; 80 single precision MFLOPS; 22 megawhetstone	16 bit	Diagnostic, NDP 860 compiler for Fortran, C, C++ or Pascal	Full	Coprocessor	30 days	1 year	$6,995, with 8M bytes of memory and compiler
	Fast Cache-SX	386 SX	16 or 20	80286-based IBM PC and compatibles	DOS, OS/2	Uses system memory	32K	35	Landmark speed Version 2.0: 21.3; 1,183.5 single precision kilowhetstone	16 bit	Diagnostic, installation	3/4 length	Replacement	30 days	1 year	$495 for 16-MHz version, $595 for 20-MHz
NCR Corp. **(800) 544-3333**	I486 Technology Upgrade	486	25	NCR PC386SX/MC 20	DOS, OS/2	Uses system memory/ 16M	8K	25	AIM Technology desktop publishing: 237 - 333.5 seconds, depending on workload; AIM Technology financial applications: 198.6 - 291.8 seconds, depending on work load	32	Installation	Half	Replacement	None	1 year	$3,500
Orchid Technology **(415) 683-0300**	Tiny Turbo 50/60	286	20	IBM PS/2 Models 50, 50Z, 60	DOS, OS/2, Unix	Uses system memory	32K	55	Norton SI: 22	16 bit	Installation, cache enable/disable program	Full	Replacement	None	4 years	$399, plus $99 for appropriate PS/2 adapter
	Tiny Turbo AT	286	16	IBM PC AT and compatibles	DOS, OS/2	Same as above	32K	125	Norton SI: 18.7	16 bit	None	Full	Replacement	None	4 years	$599
	Tiny Turbo Xtra	286	12	IBM PC XT and compatibles	DOS	Same as above	8K	45	Norton SI: 8.2	8 bit	None	Half	Coprocessor	None	4 years	$449
	Tiny Turbo 286	286	8	8088-based IBM PC XT and compatibles	DOS	Same as above	8K	45	Norton SI: 6.6	8 bit	None	Half	Coprocessor	None	4 years	$349
Q/Cor **(800) 548-3420**	Quad 386 XT	386	16	IBM PC XT and compatibles	DOS	1M/3M	None	NA	3,571 dhrystone	8 bit	Diagnostic, installation, print spooling, RAM disk	Full	Replacement	None	1 year	$1,195
Seattle Telecom & Data, Inc. **(206) 883-8440**	STD 286 Accelerator Board	286	10 or 12	8086- and 8088-based IBM PC XT and compatibles	DOS	640K/2M	None	NA	NP	8 or 16 bit	Diagnostic, installation, print spooling	NP	Replacement	10 days	1 year	$595 - $695
	STD 386/16 Accelerator Board	386	16	IBM PC AT and compatibles, Compaq Portable II, Zenith 248/251	DOS, Unix, SCO Xenix	1M/16M	None	NA	NP	16 bit	Print spooling	Full	Replacement	10 days	1 year	$995
Sota Technology, Inc. **(800) 933-7682** **(408) 745-1111**	Sota 286i	286	12.5	8088-, 8086-based, 8-MHz IBM PC XT and compatibles	DOS	16K/4M	16K	100	Norton SI: 13.4; Landmark speed: 13.2	8 bit	Disk caching, print spooling, RAM disk	Half	Replacement	None	5 years	$395 - $1,195
	Sota 386si	386	16	Same as above	DOS	16K/4M	16K	100	Norton SI: 12.5; Landmark speed: 18.2	8 bit	Same as above	Half	Replacement	None	5 years	$595 - $1,790
	Sota Express/386	386	16	IBM PC AT, PS/2 Models 30, 50, 60 and compatibles	DOS	NP/NP	16K	45	Norton SI: 18.8; Landmark speed: 22.4	8 bit	Disk caching, installation, print spooling, RAM disk	Half	Replacement	None	5 years	$595
Verified Technology Corp. **(619) 489-9336**	VT 286 Accelerator Board	286	12	8088 IBM PC XT and compatibles, Compaq Portable	DOS, Thoroughbred	Uses system memory	8K	55	Norton SI: 9.6 - 11.2	16 bit	Diagnostic, installation	Half	Replacement	30 days	1 year	$299

[1] Performance benchmarks were provided by vendors and are based on industry-standard measurements. Norton Speed Index was developed by Norton Computing to measure the speed of a processor relative to an IBM XT. Landmark Speed is a similar measurement developed by Landmark Systems, Inc. AIM Technology is a rating, measured in seconds, of application processing in an OS/2 single-user, multitasking environment.

The companies included in this chart responded to a recent survey conducted by *Computerworld.* When a vendor is unable to provide specific information about its product, the abbreviation NP (not provided) is used. When a question does not apply to a vendor's product, the abbreviation NA (not applicable) is used. Further product information is available from the vendors.

Movers, shakers, pressure makers

For many, IS life in the '90s is exciting but brings extra stress

BY ALAN J. RYAN

First in an occasional series.

LIFE *in* IS

For Jean Straehl, it's the sheer volume of work. "I'm always buried," says Straehl, manager of distributed information systems at COM/Energy Services Co. in Cambridge, Mass. "I always have mail on my desk from two years ago that is still unopened."

John W. Owens, vice president and chief information officer at Sara Lee Hosiery in Winston-Salem, N.C., is energized by the "major opportunities" in IS today. He finds the global opportunities "extremely intense and exciting."

For Brian Camenker at Dynamics Research Corp. in Wilmington, Mass., it's family and personal pressure. Ten years ago, Camenker — now a senior systems analyst at the government consulting firm — thought little of working from 8 a.m. until midnight. "Our whole lives revolved around it," he recalls. "But now we're all a little older; we have families, and my body can't take those kinds of hours."

The 1980s transformed many parts of everyday life in IS. Changing corporate structures, rapid technological advances, globalization and a host of other social and economic forces created a new daily reality in the 1990s that IS workers and consultants say is both more stressful and more exciting than before. Not all of the change has been bad, they note.

"In the past 10 years and even more recently, [IS] people felt they were part of a support service like heating systems or janitorial service," says Christine Bullen, assistant director of the Center for Information Systems Research at the Sloan School of Management at MIT in Cambridge, Mass. "Now, with information technology creeping into the business in so many ways, the people supporting it feel more valuable and wanted."

Indeed, for many IS chiefs, the 1980s meant vacating their windowless back rooms for sunny corner offices, private parking spaces and six-figure salaries. Even at lower levels, technological developments such as computer-aided software engineering and fourth-generation languages have helped alleviate some of the more mundane and tedious aspects of programming. The result has been that many IS workers at all levels have gone from being nondescript background employees to decision makers, movers and shakers.

These improvements in stature and job responsibilities carry a high price tag, however: Today's IS work force faces demands a previous generation did not experience.

Stella Johnson

COM/Energy's Straehl: *Her IS group is "here late every night"*

The following are some of the biggest issues and pressures IS people say they face today:

- **Business mainstreaming.** At one time, it was not uncommon for IS workers to think of themselves as "isolated specialists," Owens says. Today, in many organizations, IS is more actively involved in many aspects of business planning and decision-making.

Increasingly, information technology is seen as an important contributor to the firm's bottom line. This means IS chiefs and workers today have to have more business savvy and must completely understand the business of the company they are supporting.

"People residing in IS today are more bottom-line results-oriented than they were five or 10 years ago," says James C. Miller, vice president of information technology at James River Corp. of Virginia in Richmond.

For many IS workers, having to learn the business has added new job pressure. "Being strategic and important to the business means there is more pressure to perform," Bullen says.

"We are no longer just a support group," says Karl Swanseen, director of MIS at Trump Plaza Hotel and Casino in Atlantic City, N.J. His group often works side by side with top executives on direction, planning, creativity and marketing. "Our successes and failures are directly related to the company's profitability. Driving revenue and cutting costs is part of the process now."

- **Fuzzier organizational structures.** One way firms help computer professionals learn more about the business is by placing IS workers in the user departments or business units. These new organizational structures and alliances are a far cry from the old glass house days, when IS ruled its own kingdom and challenged traditional IS identities.

According to Miller: "Five or 10 years ago, every MIS organization was a fairly stand-alone, separate, distinct entity that had requirements thrown over the wall and threw systems back at it. Now IS organizations that are effective . . . are matrixed to a set of user communities."

In many cases, IS groups are adopting consulting roles within their own organizations, creating new identity and stress issues. For example, at Echlin, Inc. in Branford, Conn., structural change followed a downsizing from mainframes to networked personal computers.

Explains Richard Hock, director of MIS at Echlin: "We have pretty well decentralized completely, and so the role of corporate management information systems is to consult with the divisions, set policy and standards, review and approve systems plans and

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Ryan is a *Computerworld* senior writer.

expenditures and attempt to guide them. That was not the case 12 years ago."

While such moves might make organizational sense, IS workers say the migration into business units and blurring of lines of authority often create new stress. Mixed allegiances can make IS workers uncomfortable because they are being pulled in two directions.

"In the old days . . . it was clear who you worked for, where your bread was buttered," says Steve McMahan, managing director at placement firm Source EDP. "Now, with more and more people working in decentralized departments or for an end-user group dotted-lined to IS or vice versa, people find themselves between competing constituencies."

He continues, "On one hand, you've got the IS department saying, 'Get this system done on this time table, at this cost and in this manner,' and on the other, an end user who may have a very different agenda."

- **Greater user pressures.** A decade ago, the "customers" of IS were generally happy to get what they ordered and said little else. Today, a new generation of computer-literate users is demanding much more from IS professionals.

"They look at us like we're stupid if we don't have all the answers," COM/Energy's Straehl laments. Dynamics Research's Camenker notes: "You have to ask the right questions and be able to derive from that exactly what they want from you. That's the pressure."

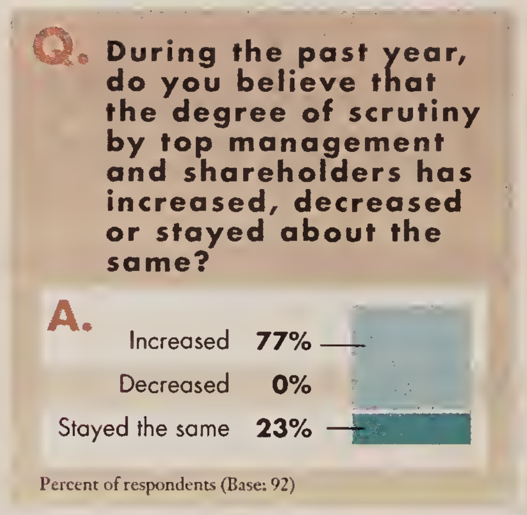
- **Shorter deadlines.** Moving into the business mainstream has another consequence: less time to complete projects.

"Deadlines have shortened dramatically," MIT's Bullen says. "In the past, a major IS project might have had a two- to five-year horizon from plan to delivery. Now, people are talking two to three months."

Echlin's Hock agrees that tighter deadlines are one of the biggest stress inducers for IS. "The problem is that people start with unrealistic target dates, or they fail to bring management on board to help with the problem assessment and to be part of the project," he says.

All eyes on IS

With higher visibility and prestige comes more scrutiny



Source: *Computerworld* Survey of Premier 100 Winners
CW Chart: Doreen St. John

When that is the case, workers find themselves working long hours, and consequently, their work can become sloppy and the turnover rate increase, he says.

An unfortunate side effect, Bullen adds, is that projects come and go much more quickly, which can give IS workers the message that their work is less valued. "People who have grown up feeling they are building these monuments for their existence are not as happy in a world where they throw things away in six months," she says.

- **Longer hours.** Never famous for its short work weeks, computing is now even more of a time-consuming task for many IS professionals. Downsizing is a big reason. Observes McMahan: "Companies in which there are maybe 20% fewer workers aren't necessarily reducing the work load by 20%."

"The people I talk to are working later and harder," says placement specialist Brian D. Leary, vice president of IS placement at Robert Kleven and Co. in Boston and Lexington, Mass. "Companies tend to get a lot more out of their people now."

Of course, "info systems people worked 60 and 80 hour weeks 10 years ago," James River's Miller notes. The difference, he says, is that "work today has more consequence as far as business is concerned."

At COM/Energy, for example, Straehl says that IS puts in longer hours than other departments. "This is a typically regulated environment, and most workers leave on the dot every day with no exceptions," she says. But her group is "here late every night," and for some, the day often stretches until midnight.

Even when they are home, IS workers are not typically able to shut out work completely. "It's a hard line to say when you stop work," says Pat Wallington, vice president and chief information officer at Xerox Corp.'s U.S. Marketing Group in Rochester, N.Y. "You might be thinking of ideas while watching TV."

IS workers "are never quite free from the job," agrees Paul Berger, president of Paul Berger Consulting and PBC Management Video Programs in New Jersey. "People aren't working fewer hours — but with personal computers, they can control the location where they work, which can mean going home at a decent hour and putting in a couple of hours of work after the kids have gone to bed."

Many people are also working harder, employment recruiters add, because increased job competition makes it more difficult to move than it used to be. Fear and uncertainty about further layoffs, mergers and restructures tend to make people work even harder, Leary explains.

Still, not everybody is necessarily laboring longer and harder. Technological advances have actually made some drudgery go away, Wallington says. "In the past, you might be here doing testing at 2 a.m. or fixing a system in the middle of the night. Today, we have a different environment. Technology is readily available, and people get all their work done during the day and can do things from outside the office. The hours might not be longer and, in some cases, might be shorter."

- **Family pressures.** The long hours required in many IS shops has strained

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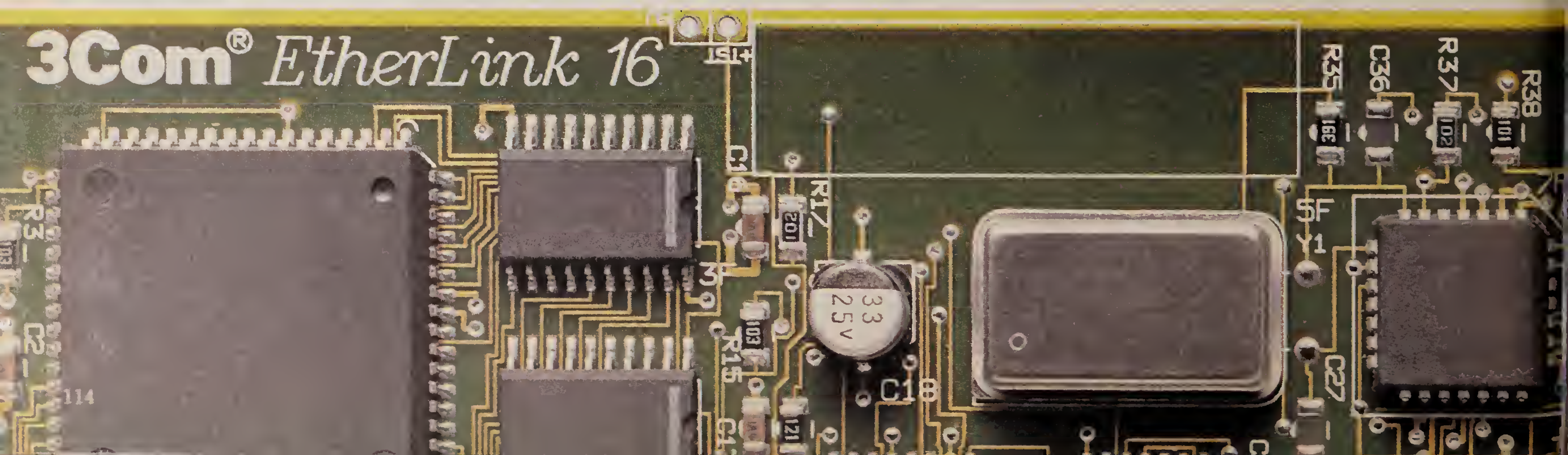
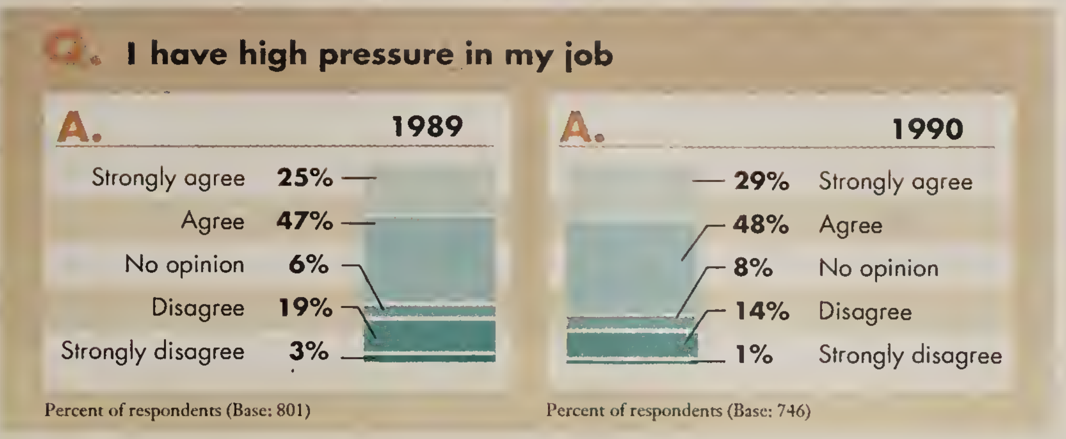


Pressure cooker

During the last 12 months, information systems managers report an increase in work pressures



Source: *Computerworld* Job Satisfaction Survey

CW Chart: Doreen St. John

many a family relationship. While work vs. home has been a struggle for many IS professionals, tougher economic times and an increase in two-earner families have pushed the issue into the forefront.

Many IS professionals are facing difficult new choices between work and family. Dynamics Research's Camenker, for instance, would like to learn more about object orientation but can't seem to find the time during normal working hours. "I can't stay late at work," he explains. "I have a wife and two kids — I can't go home and start pecking away at that like I would have before."

Camenker, 37, says his wife "has laid down the law that I have to be home at 6 and have to spend some time with the kids." So he leaves for home at 5:15 and logs in two hours at his terminal once his children have gone to bed.

Many firms have recognized the strains IS workers face and have implemented flex time, day care and other options aimed at easing the burden. Of course, the work vs. family debate is not a problem for everyone. MIT's Bullen notes that many entrants into the work force are motivated by money rather than family.

"We are seeing a new generation of Alex Keaton types — another generation of workaholics coming down the pike. I don't know what it is going to take for them to realize that there is a life outside of work," she says.

• **Technology and information overload.** Another big stress factor, interviewees say, is keeping apace of technological change and making tough technological decisions. Buy or lease? Local-area networks or minicomputers? CASE tools? Downsizing?

"Anybody tied to the traditional mainframe computing is feeling overwhelmed because they can't stay there and stay comfortable, Bullen says. They have to keep changing."

"I'm getting to the point where I can't grasp the stuff as fast as it is coming at me, and I can't change as fast as the world is changing," Camenker says. Like many IS professionals, he desperately tries to keep up with the latest advances but finds it nearly impossible. "You read the trade journals, and it sort of scares you to even read them because there is always something new. Nobody I know has the time to explore these new things, because you're too busy doing your job."

• **Complex career decisions.** A more subtle pressure facing many IS professionals is an uncertain career path and the complexity of career decisions. "Ten years ago, the bulk of IS professionals worked in IBM mainframe environments that were . . . pretty generic," Source EDP's McMahan notes. "Now that world is much less homogeneous. You can go from being very marketable to very unmarketable very quickly."

Moreover, workers who are slow to adapt to the changing technologies and methodologies affecting today's IS may find themselves seemingly unemployable. Workers who don't stay on top of new technology can find themselves becoming obsolete or swept into a pigeonhole.

As if that isn't bad enough, IS workers also have to worry about an often uncertain general business climate and its inevitable mergers, buyouts and restructuring that can put jobs in jeopardy, placement officials say.

Along with greater technical demands is the pressure to learn more about business disciplines. The need to learn a whole new language and reality can be daunting, recruiters note.

Yet the push for business knowledge is a two-edged sword. Increasingly, IS can be viewed as a stepping-stone to jobs in other parts of the firm. According to the 1990 *Computerworld* job satisfaction survey of 755 IS professionals, nearly one in four said their IS department provides them with the right opportunities to advance to non-IS management positions.

Indeed, during the past two years, several high-profile IS executives have moved to other management positions.

"In the successful corporation of the future, it will be difficult to tell if you're talking to a business person who is technically savvy or a technical person who just knows the business," Wallington says.

In the face of such changes, younger IS professionals wonder what their next step will be. Camenker says the changes in his lifestyle may lead him to a career change during the next several years.

"I'm not 25 and can't drink coffee 24 hours a day and soak all of this stuff up. I don't want to continue to sit in front of a computer designing and programming when I'm 50," Camenker says. •

In next week's issue: *Handling the pressure.*

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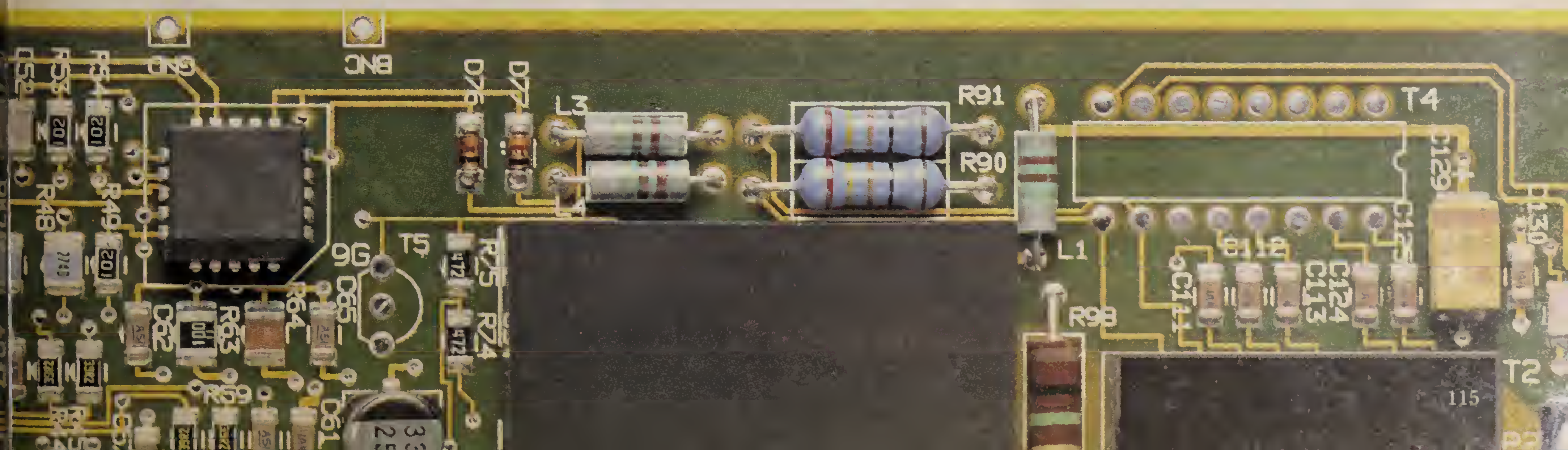

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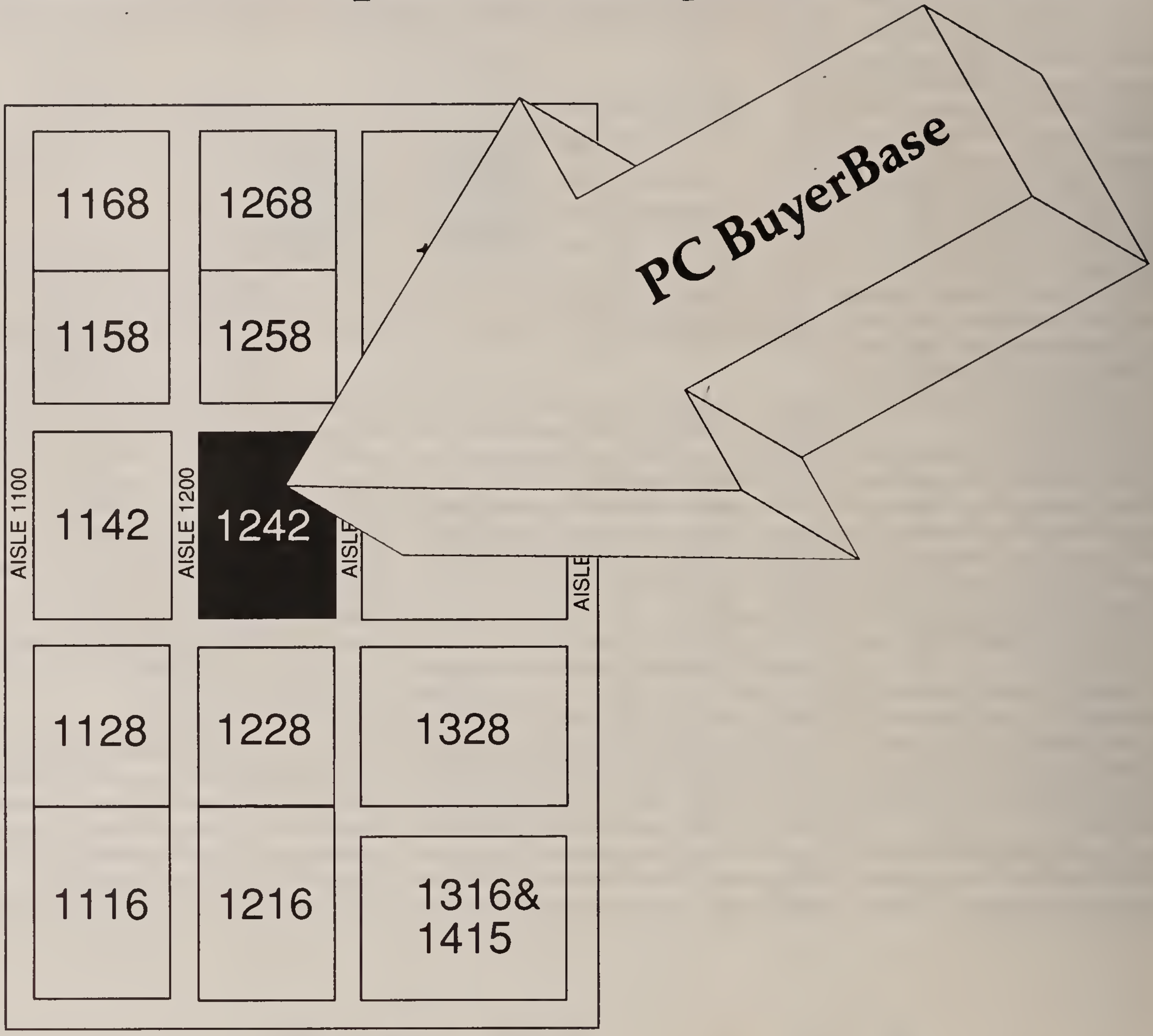

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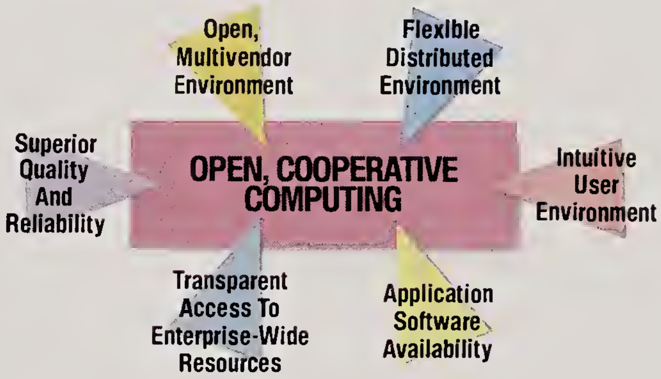
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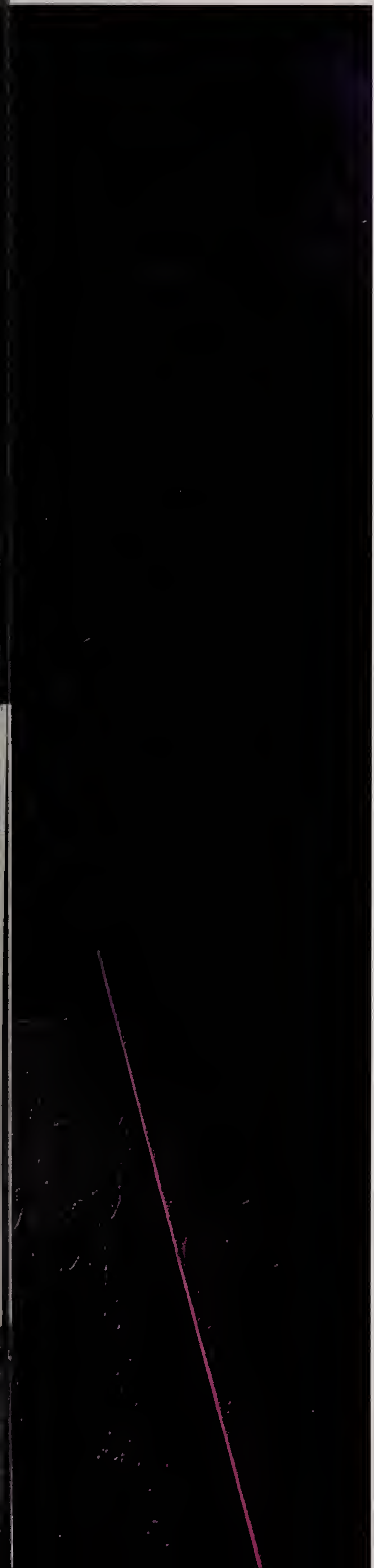

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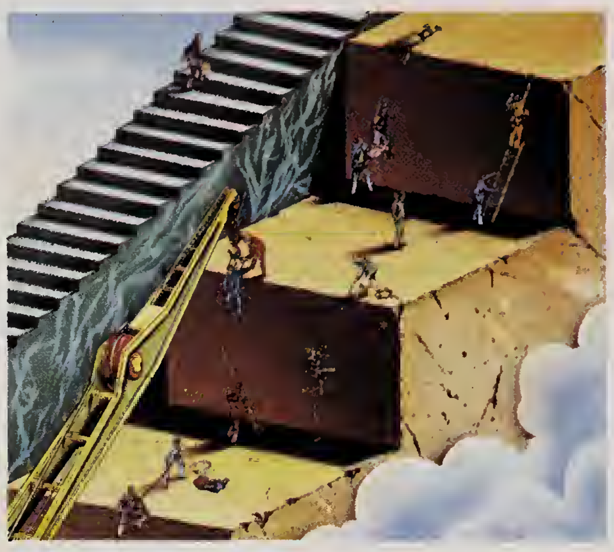


The NCR 3000 lets you add processing power in cost-effective, incremental steps, rather than large, expensive ones.

The NCR System 3000 brings this step-change in technology to a complete family of scalable platforms, running open operating systems like UNIX,® OS/2 and MS-DOS. The System 3000 is designed to connect to your current systems environment, while providing a transition to the more cost-effective, flexible, open environment of the future.

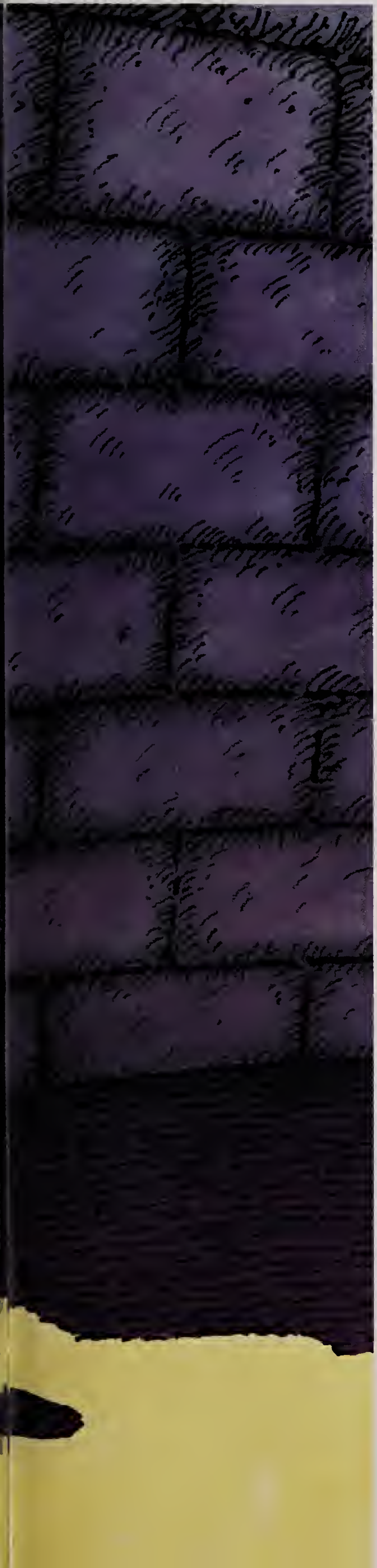
From desktops and large servers to future massively parallel models offering more than 100,000 MIPS, our new System 3000 family will provide an unequaled range of performance. So you can add the power you need, when and where you need it.

The NCR System 3000 takes advantage of the Intel® x86 chipset series—the most powerful microprocessors available—to provide you flexibility in design and integration, and an extensive set of existing applications, tools and peripherals. In fact, this new system will be among the first to use Intel's new 50MHz i486® microprocessor in a multiprocessing design.

The System 3000 offers total scalability of hardware *and* software, and complete object code compatibility, to give you access to an enormous application software suite. Three levels are now released for sale—offering performance from 7.5 to 320 MIPS. And support for the computing needs of one to hundreds of users.

Free Your Org
The Limitations Of

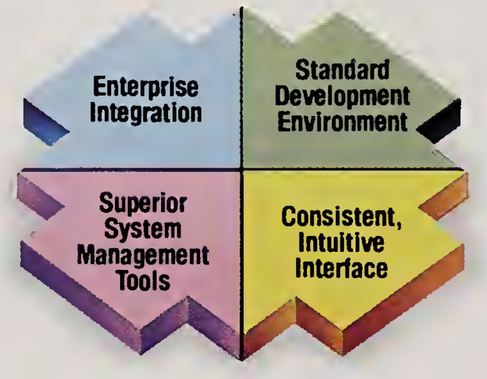
ganization From Conventional Systems.



Introducing Cooperation.™ The Open Enterprise Integration Environment.

Conventional systems have spawned islands of information that separate departments and impede workflow more effectively than any wall.

The answer is NCR Cooperation. Software that integrates the general-purpose applications and platforms in your organization into one flexible, cooperative system with a consistent, intuitive graphic interface.


Enterprise Integration
Standard Development Environment
Superior System Management Tools
Consistent, Intuitive Interface

Cooperation benefits everyone in your organization. It lets MIS managers integrate multimachine, multivendor, multistandard environments, with the tools needed to create and manage a complete enterprise-wide network.

Its Business Information Monitor facilities allow executives to access the entire knowledge base of the enterprise from their own workstations.

And it aids software developers by speeding both new application development and the extension of conventional mainframe and minicomputer applications.

Cooperation allows access to your enterprise's resources from every desktop. It features powerful tools, including the latest in distributed *object* technology, that insulate both software developers and users from the complexities of the operating environment. Object-oriented programming lets developers reuse code, easing the job of building or modifying complex programs. And reducing the time and cost of development and training.

Cooperation can set your organization free from the rigid, hierarchical computer architectures of the past. Free from dependence on the vision of a single vendor. Free to meet the challenges of the future as you see fit.

Introducing The First Network Without Proprietary Roots.

NCR's new Open Networking Environment™ offers the first set of end-to-end networking products based on the Open Systems Interconnect (OSI) model.

ONS simultaneously bridges or routes:

- OSI
- TCP/IP
- SNA
- DECnet
- NetWare IPX
- XNS
- NetBIOS
- DEC LAT
- X.25
- AppleTalk
- Ethernet
- Token Ring
- StarLAN
- And more.

Open Networking System™ (ONS)—an intelligent networking system—is designed to implement all seven layers of the OSI reference model to provide intelligent network application services and extensive internetworking capabilities.

It also interconnects varied LANs and WANs to help leverage your existing investment and save money by sharing communications resources. Its extensive SNA capabilities let you coexist with conventional networks while moving to an open environment.

ONS also supports network management:

- CMIP/CMISE
- SNMP
- NetView
- NET/MASTER

The Open Networking Environment also includes the powerful network management capabilities of NCRNet Manager. Also OSI-based, NCRNet Manager provides centralized management of both the internetworking environment and its attached systems.

The Network Without Wires.

The new NCR WaveLAN uses radio waves to let you build an industry-standard LAN without wires. So you can put people and PCs wherever you need them. Without the time and cost of installing or moving a wired LAN.

For more information, phone 1-800-CALL NCR.

We'll help you grow truly open, enterprise-wide computing.

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Open, Cooperative Computing.
The Strategy For Managing Change.

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COMPUTER INDUSTRY

NATIONAL BRIEFS

All together now

When **The Software Business Practices Council** kicked off its campaign to promote ethical software industry ways and means from within, several key players declined to sign on. This was a reluctance, said executives from such powerhouses as **Computer Associates International, Inc.** and **Dun & Bradstreet Software**, that could fade if the fledgling activist group were to join forces with the already established cleanup campaign of industry association Adapso. Last week, at Adapso's fall management conference in Phoenix, the two watchdogs announced official merger plans.

Ultimate sacrifice

In an effort to stanch its flow of red ink, **The Ultimate Corp.** is laying off what so many other firms are piling on: worldwide staff. Cutting its work force by some 25%, or 175 jobs, will allow the East Hanover, N.J., firm to speed up a shift to software and services already under way, according to Ultimate. The cuts, all but 40 of which will come from international operations, will leave customer service and applications software development unscathed.

No joy in businessland

Businessland, Inc.'s string of quarterly losses has stretched to four, with the latest a $19.9 million drop for the quarter that ended Sept. 30. The personal computer dealer's earnings totaled $308.9 million, 2.2% lower than the corresponding quarter last year. In view of the numbers, Chief Executive Officer David Norman said last week that he has increased his layoff target from 10% of the work force to 20%. The company has closed 21 facilities since June 30.

Am I blue?

For some 22% of Bedford, Mass.-based **Atex Publishing Systems'** work force — including President David Monks — the answer will be "no." Within weeks of a 200-person layoff, Atex reportedly informed remaining employees last week that Chief Financial Officer **John Le Tourneau** will replace Monks and serve as acting president to oversee the implementation of the company's publishing systems alliance with **IBM**, which was announced last summer.

Looking for Mr. Good Boss

BY SHERYL KAY
SPECIAL TO CW

If you had your druthers, where would you like to work? *Computerworld* posed that question to 800 information systems, computer science and electrical engineering students throughout the country and came up with a list of their top 10 choices. Applying criteria such as opportunities for further education and training, a global corporate outlook and meaningful responsibilities, they came up with the following Top 10:

No. 1: IBM — Well over half of the students listed Big Blue as their top choice. "IBM is the pacesetter," explained Angel Mays, currently working toward a bachelor's degree in computer science at Franklin University in Columbus, Ohio. "When it takes the lead, everyone else follows," she said.

"Students coming to work for us will work with leading-edge technology, in small teams and with a diversity of assignments," said Lee Covert, manager of IBM's Purchase, N.Y.-based national recruiting organization. For Mays, that job description sounds just right. "I love making that bucket of bolts do what I want it to do," she said.

No. 2: AT&T — While earning a master's degree in business management at Central Connecticut State University last year, Raymond Papp wrote a paper on AT&T's signaling system. Now he would like to work at the firm. "I found AT&T to be an international pioneer in the field," he said.

The Top 10 places students want to work

①	IBM	497
②	AT&T	342
③	Hewlett Packard	191
④	DEC	134
⑤	Apple	101
⑥	General Electric	95
⑦	Motorola	85
⑧	Arthur Andersen/ Andersen Consulting	65
⑨	Microsoft	64
⑩	Intel	51

Total responding: 772

(Students were asked for their top five choices; the list reflects the total number of mentions of each company.)

Source: *Computerworld* survey   CW Chart: Paul Mock

Recent graduates are attracted to AT&T because of its worldwide product and services reputation, said Gale Varma, manager of corporate college recruiting. "We are a global company with projects of international scope, and global is in with the students today," she said.

No. 3: Hewlett-Packard Co. — Students who seek a team-oriented environment, yet want an opportunity to express individual creativity would feel right at home at HP, said Kathy Burke, the company's national college relations and recruiting manager. According to Burke, HP is marked by informal management and community commitment. That suits Eli Robinson, a first-year MBA student at the University of Vermont, perfectly, he said. Robinson, who is interested in sales, says that he would like to work for "a company that puts out quality products, because I'll be selling directly to the end user, and it's important to represent something that won't come back to haunt me."

No. 4: Digital Equipment Corp. — DEC's presence on campus leaves a lasting impression, according to college program personnel consultant Deann Sklenak. Many students who have worked on VAXs at school turn to DEC upon graduation, she said.

Alec Berenbaum agreed. Having worked with DEC equipment and service personnel, Berenbaum, who is currently pursuing a master's degree in computer science at the Rochester Institute of Technology in New York, ranks the firm among his top choices for employment.

No. 5: Apple Computer, Inc. — The "Apple campus" in Cupertino, Calif., is described as casual and laid-back, "an easy transition from college," said Apple college relations staffing specialist Ron Jennings. In addition, Rob Sabey learned from friends who were interns at Apple that new hires were given project responsibility from day one.

Continued on page 122

Survey of software firms taps industry's hot buttons

BY PATRICIA KEEFE
CW STAFF

NEWTON, Mass. — Two unlikely bedfellows, graphical user interfaces and quality assurance programs, are the hot issues at software companies these days. Also soaking up developer energy is support for multiple operating systems — whether by choice or not — and a general shift toward networking, according to the Massachusetts Computer Software Council's second annual Business Practices Survey.

The council is a nonprofit industry association of some 160 chief executives of Massachusetts companies. Jointly sponsored by Price Waterhouse, the survey asked participants a host of questions about all aspects of the firm's business, including management, growth, technical strategies and products and pricing issues. Approximately 500 software companies responded to a mailing of 2,700 surveys.

The profile of the typical software company depicted a profitable, $7.5 million outfit, dependent on the international sector for 25% of its revenue.

At 45, the average chief executive officer stands at the helm of a 7- to 8-year-old firm, typically focused on the utilities, accounting, database and development tools markets.

With the shadow of a recession, war or both hanging over their heads, it is not surprising that financial concerns topped the list of common concerns that emerged. More than half of the respondents, 57%, are concerned about profitability, even though all those who responded are profitable now. "Most software companies are small; if they don't worry about being profitable, they won't be here next year," said Lotus Development Corp. Vice President Frank Ingari.

Yet the economy is not the chief issue, he said, adding that software tends to require a higher overhead in order to support multiple platforms, integration projects and networking.

A slightly smaller number, 47%, noted concern about short-term cash flow, an issue brought to the fore in recent months as a number of companies, notably Oracle Systems Corp., have stumbled.

With profits and cash availability weighing heavily on minds in the executive suite, it appears that marketing efforts may come in for close scrutiny in 1991. Cost-effect marketing was an issue for 47% of all respondents, as was recruitment of quality employees (43%).

Despite the money worries, software investors appear to be relying less on public offerings and venture capital and more on their own private funds to pay the bills. The number of plans to go public have plummeted as acceptance of a slower growth model has grown, Ingari said. "For some period, like 18 months, the striking-it-rich aspect of software will be a bit slower," he predicted.

Strong regional affiliations also popped up, Ingari said. As might be expected, West Coast companies placed a far greater emphasis on Apple Computer, Inc.'s Macintosh platform, whereas Massachusetts companies were much stronger on the Digital Equipment Corp. VAX.

The study also revealed a dramatic difference in the commitment to quality assurance between this year and last year. More than 40% of the companies with 10 or fewer employees have formal testing programs, and nearly 90% of the firms with 60 or more employees do.

Bottom-line importance

At most software companies, profitability is a top concern

AVERAGE COMPANY PROFILE	
Revenue (millions)	$8.0
International revenue	26%
Profitability? Yes	71%
Number of products	9
Company age (median)	8 yrs
Number of employees	106
Average age of CEO	45

Bose of 466 respondents

HOW IMPORTANT IS ...	
Profitability	57%
Short-term cash flow	48%
Cost-effective marketing	47%
Recruiting quality employees	43%
Long-term financing	23%
Domestic competition	23%

Percent of respondents
Base of 466 (multiple responses allowed)

Source: Massachusetts Computer Software Council   CW Chart: Marie Haines

Directive threatens EC computer industry

BY MARK HAMILTON
SPECIAL TO CW

LONDON — Major users and computer companies say the entire European computer industry is under immediate threat from the UK government's amendments to the proposed European Community Directive on the legal protection of computer programs. If ratified by the Council of Ministers and adopted by the member states, it will, for example, prevent companies from making personal computer-compatible hardware, according to UK-based computer industry executives.

The amendments, sponsored by the UK Department of Trade and Industry (DTI), have been spurred by the Software Action Group for Europe (SAGE), which includes such firms as IBM, Digital Equipment Corp. and Lotus Development Corp. SAGE wants to strengthen existing copyright legislation by making it illegal to decompile programs for the purposes of creating competitive products.

A DTI spokesman explained that the law would allow computer companies to reverse-engineer a product to the extent needed to enable such companies' own creations to connect to the reverse-engineered technology. Decompiling to make the new product compatible with the original would be prohibited.

The European Committee for Interoperable Systems (ECIS) argued that the proposals effectively prohibit the creation of truly compatible, competitive products. "The European Community is on the verge of putting its computer users at the mercy of IBM, DEC and a couple of other multinationals, none of whom have shown much interest to date in providing their customers with products acknowledged as being the best value for the money," said Alan Sugar, chairman of UK-based Amstrad PLC.

"It spells disaster both for manufacturers and users," said Peter Horne, managing director of UK-based Apricot Computers PLC. "If the amendment is incorporated into the EC Directive, Europe will lose its own [information technology] industry and become merely a marketplace for non-EC manufactured products." If the amendment goes forward, Horne said, "We will have to review our long-term investment for research and development and manufacture in Europe. And we will by no means be the only ones to do so."

ECIS numbers over 50 major manufacturers of computer hardware and software as well as large corporate users, including the Automobile Association, Safeway, Coopers & Lybrand, Deloitte Touche and Securicor.

France's Groupe Bull, another ECIS member, said these proposals are inconsistent with the DTI's publicly stated strategy toward open systems. "The directive will slow the movement toward open systems," said George McNeil, chief executive of Bull in the UK. "It is a serious threat to the European computer industry, and the proposal should be emphatically rejected."

Neither IBM, DEC nor Lotus would comment in defense of SAGE's position.

Hamilton writes for PC Business World, *an IDG Communications British publication.*

ICL exec: Fujitsu takeover won't alter firm's identity

AUCKLAND, New Zealand — ICL, Inc. said it does not believe its recent $1.9 billion takeover by Fujitsu Ltd. will result in major cultural or directional changes, and it will continue to compete on the open market with its new parent.

"We'll preserve the identity, strategies, structures and skills, which have worked so well for us," said ICL International President Richard Livesy-Haworth, during a recent tour of New Zealand. Livesy-Haworth is responsible for the profitability and growth of ICL outside the UK.

"Since 1981, ICL has increased both revenue and profit year in and out, along with productivity and return on capital. We are the most profitable computer company in the world, even ahead of IBM, [Digital Equipment Corp.] and Fujitsu," he claimed. The reason for that success, he said, has been ICL's clear objectives and strategy, "outstanding staff and classy management. We know where we are going and how to get there."

Livesy-Haworth said Fujitsu has the money to expand globally and add companies with complementary skills that are well run and sound investments.

The aim is different than the classic U.S. takeover or merger, he said. "The Fujitsu concept is to have a loose set of companies competing but with different skills grouped together for volume."

If Fujitsu is significant to ICL, Livesy-Haworth said, ICL is also significant to Fujitsu. "We effectively doubled the size of Fujitsu overnight."

Fujitsu derives 80% of its revenue from Japan, and ICL gives it an opportunity to spread its wings, he said. One of the chief advantages perceived by ICL in the takeover is the scale of research and development.

"What we face is bigger and better R&D," according to Livesy-Haworth.

"It takes more to get to market with shorter payback and less margin, and life is getting hairier. You need huge volumes to get there because computers are now a commodity market," he added.

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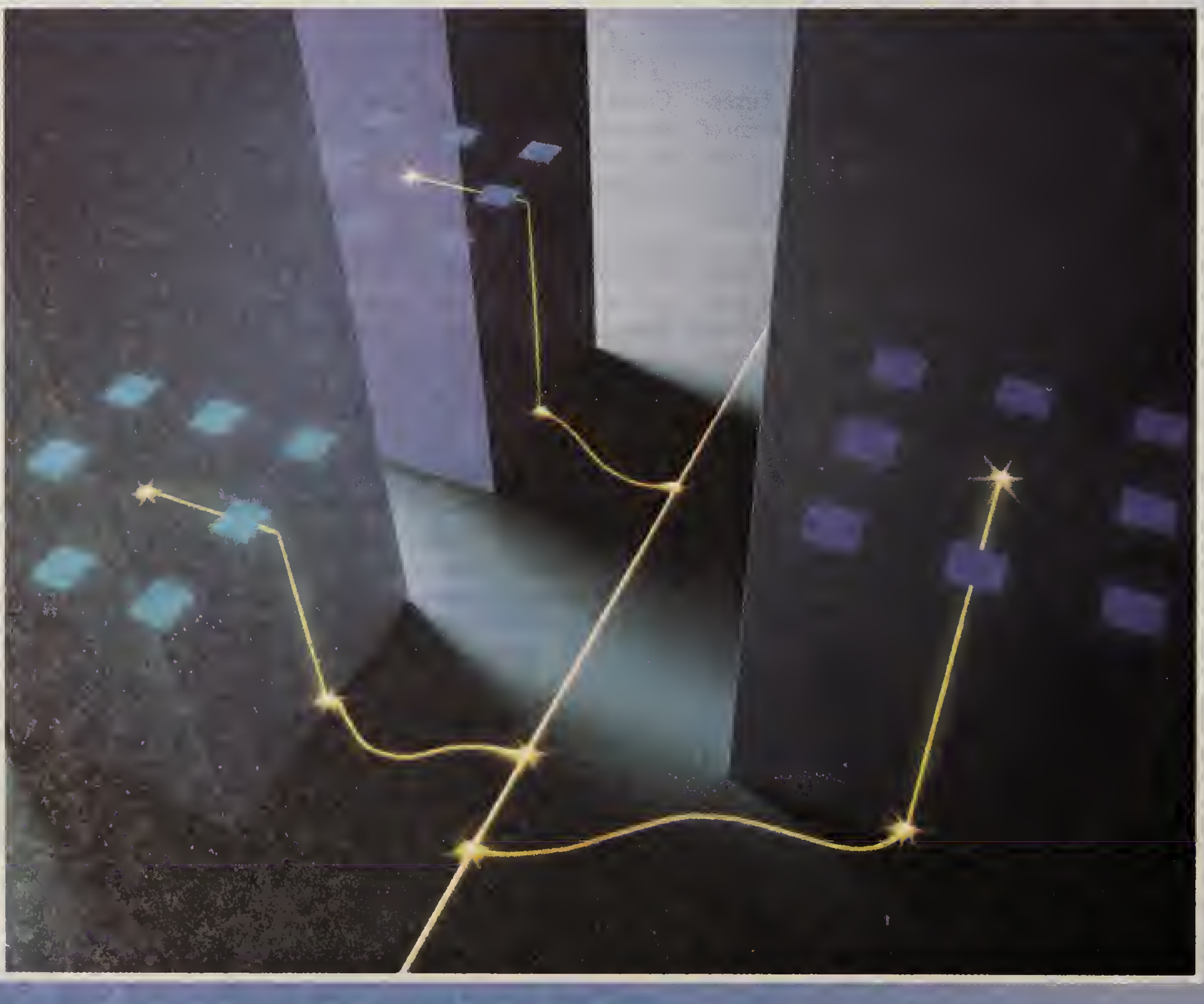

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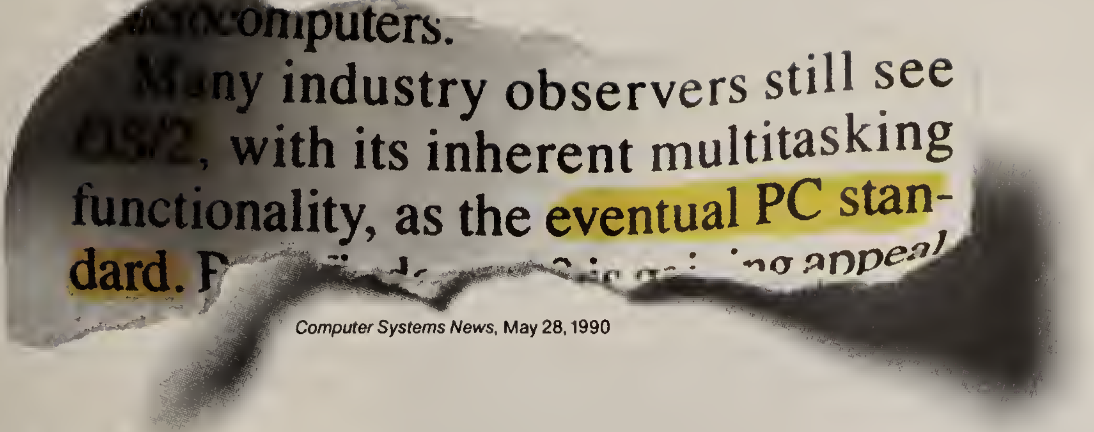
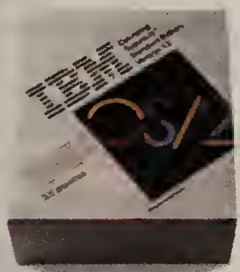


computers.
Many industry observers still see OS/2, with its inherent multitasking functionality, as the eventual PC standard. F ng appeal

Computer Systems News, May 28, 1990

"Eventually" is here.

ANNOUNCING THE OS/2 YOU'VE BEEN WAITING FOR.

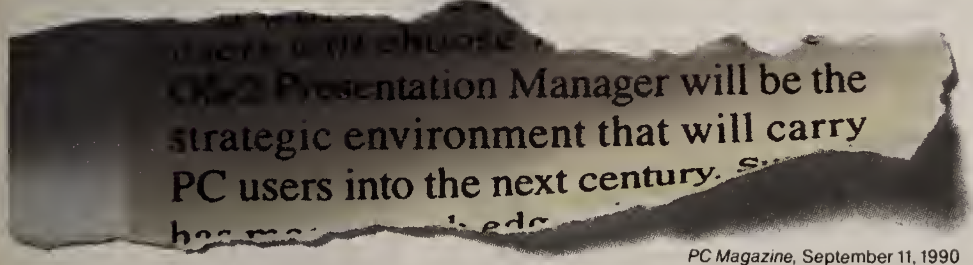


For quite some time, the press has been writing about the move everyone will want to make to OS/2.® Eventually.

Well, all at once OS/2 1.3 has made OS/2 the operating system it was meant to be—the one you'll want to move to right here and now.

OS/2 LOSES A LITTLE WEIGHT.

For starters, OS/2 has lost some of its appetite for memory. In fact, now you can make the move to OS/2 1.3 with as little as two megabytes on your system. What's more, this streamlined version leaves more room for applications and will offer some users a substantial performance increase in many system functions.



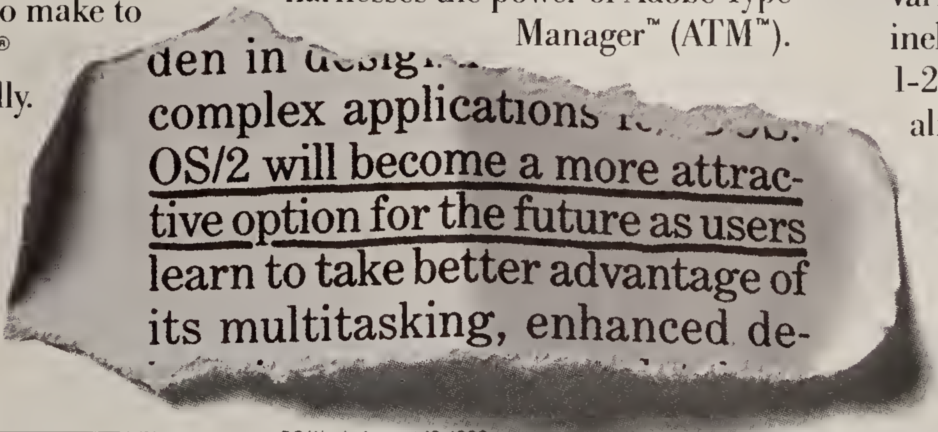
OS/2 Presentation Manager will be the strategic environment that will carry PC users into the next century.

PC Magazine, September 11, 1990

FUNCTIONALITY. FUNCTIONALITY. AND DID WE MENTION FUNCTIONALITY?

Multitasking. Seamless connectivity. The ability to run applications larger than 640K. DOS® compatibility. All these features have made OS/2 appealing in the past, but new features have catapulted OS/2 into the here and now.

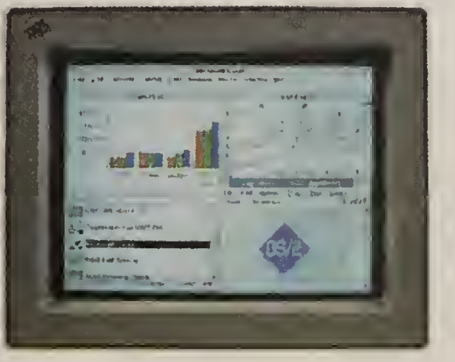
For instance, now OS/2 1.3 harnesses the power of Adobe Type Manager™ (ATM™). With this new feature, the quality of screen fonts has improved dramatically, giving you a true WYSIWYG capability so what you see is indeed what you get. ATM also gives OS/2 more flexibility in document creation by supporting a wide range of outline fonts.



den in design
complex applications
OS/2 will become a more attractive option for the future as users learn to take better advantage of its multitasking, enhanced de-

PC Week, August 13, 1990

Of course, what good is all this without printer support? Not much. So OS/2 1.3 has improved and expanded its printer support to include drivers for almost all popular printers.

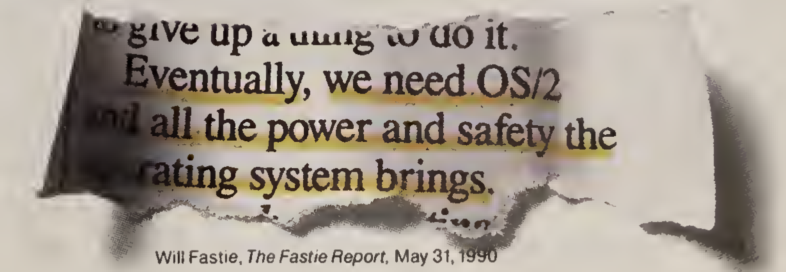


BUSINESS IS BOOMING.

Now that OS/2 is moving forward, so are software developers. Every day, more and more applications are joining the growing pool of available OS/2 software. In fact, a variety of major business programs, including Aldus® PageMaker,® Lotus® 1-2-3/G® and Microsoft® Excel, have already made the transition to OS/2.

These, along with many others, have been redesigned to go beyond DOS memory limits and take advantage of OS/2's intuitive graphical interface—Presentation Manager.™

It's been said that eventually you'll want to take advantage of everything OS/2 has to offer. Well, wait no more because "eventually" is here.



give up a thing to do it.
Eventually, we need OS/2
d all the power and safety the
rating system brings.

Will Fastie, *The Fastie Report*, May 31, 1990

For more information on what OS/2 can do for you here and now, or to get details on a no-charge upgrade to Version 1.3, contact your IBM Authorized Remarketer or marketing representative.

OS/2 can do!

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Sweden revises VDT standards

BY J. A. SAVAGE
CW STAFF

Under pressure from manufacturers and unions, Sweden's National Board for Measurement and Testing recently decided to expand guidelines on electromagnetic emissions from VDTs.

Since 1987, Sweden has had guidelines for mechanical, optical and emission characteristics of VDTs. Under the earlier guidelines, only one magnetic field — verylow frequency — was under consideration. However, in re-evaluation last month, the board noted that emission characteristics were the most important to users. With the new regulations, both very low and extra low frequencies are considered.

However, ergonomic properties, such as pressure needed to depress keys and the monitor's height and weight, were dropped from consideration.

As in the U.S., where local, state and federal governments have clashed over the question of who has the right or responsibility to regulate VDTs, Sweden's Board for Testing attempted to leave workers' health regulation to another government body. "If VDTs were proven health hazards, it would be up to [another government agency] to issue regulations on limits of exposure," a board spokesman said. However, the board acknowledged that "any decision to exclude [electromagnetic] limits was met by a very strong reaction from users' organizations and manufacturers."

EXECUTIVE CORNER

Vitalink ends search, finds CEO

Fremont, Calif.-based local-area network interconnect processor vendor **Vitalink Communications Corp.** announced the appointment of former 3Com Corp. executive **Leslie G. Denend** as chief executive officer and president. Denend replaces **Donald J. Herman**, who came out of retirement to man the front office during Vitalink's CEO search. Herman will complete his term as chairman of the board.

Legent Corp. has a new post and a new executive to fill it. **Robert Yellin**, who has spent the past five years heading up product development for Legent's Westboro, Mass.-based software management division — formerly Business Software Technology, Inc. — is now Legent's vice president of technology.

Yellin, 37, will report to Legent president and fellow BST alumnus John Burton.

WHAT DO THE FOLLOWING COMPANIES HAVE IN COMMON?

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FileNet

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What's so special about Frances Gustavson?

Dr. Frances Gustavson began her career at IBM's T.J. Watson Research Center in 1964. Since then, she's held several key positions in the industry, including first chair of Pace University's Westchester Information Systems Department, and has been a consultant in the industry. Those 26 years of experience give her a special insight when it comes to teaching.

"When experienced professionals return to the classroom it's because they want to further their careers. Pace offers a range of programs that have been specially created with that person in mind.

"Pace programs have been designed to give you experience and expertise that go far beyond your degree: how to think; how to apply what you know to solve problems; and how to continue growing professionally once you've left the classroom.

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"The Master of Science degree in Information Systems is another first for Pace. Most schools offer this kind of coursework only as part of an MBA program. But this was specially created for people who want to develop ways to integrate computers into modern organizations.

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Tech transfer program succeeds

BY J. A. SAVAGE
CW STAFF

California's Department of Commerce Competitive Technology Program late last month announced the first fruits of its 2-year-old plan to transfer basic research to fuel the state's industry. If successful, however, the plan will yield its initial rewards to established big businesses, such as IBM and Hewlett-Packard Co., while start-ups wait for a second harvest.

Currently under development and funded by grants ranging from $194,000 to $483,000 are a cross between a VDT and a flat-panel LCD, several superconductors and a processor meant to increase storage density through digital signal processing.

Charles Spindt, director of the vacuum microelectronics program at SRI International, is combining the active brightness of the CRT found in VDTs with the thinness of an LCD. Spindt said a monochrome display could be on the market in "three to five years."

Paving the way for superconductors in computers is a project headed by John Clarke, senior scientist at the Lawrence Berkeley Laboratory. The superconductor project, which is still in its early development stages, is being carried on in conjunction with Conductus, Inc., a private company funded in part by HP. Thomas Walters, director of the Office of Competitive Technology, said he expects that Conductus will have an exclusive license on the technology.

John Cioffi, assistant professor of electrical engineering at Stanford University, is trying to increase storage capacity by at least 50% on disks by developing a coprocessor to digitize signals coming from the read head. Digitizing, according to Cioffi, results in a reduced error rate and thus can increase data density. Cioffi is conducting his research in conjunction with IBM.

These projects were funded in order to help grow California's economy, Walters explained. Although California leads the nation in industrial research, according to the National Science Foundation, it has little infrastructure to transfer basic research to revenue-generating industry.

While the current competitive technology programs are more likely to help big business than fledgling industry, Walters defended the gambit. "You don't want to say we only help little companies," he said. "Big companies provide a lot of employment in state."

INTERNATIONAL

BRIEFS

Hands across sea

Hewlett-Packard Co. President **John A. Young** may have his work cut out for him when it comes to shoring up his administration at home, but he is winning plaudits across the Pacific. Earlier this month, Young was the sole representative of both the U.S. and the computer industry to win the **Japanese Prime Minister's Award** for outstanding work in fostering mutual understanding on trade issues.

Aarrrggghhh!!!

Japan's **Ministry of International Trade and Industry** (MITI) was not tardy in spotting the potential of artificial intelligence; neither has MITI missed the frustrating barrier posed by artificial stupidity. After an MITI poll of 180 electronics makers fingered incomprehensible user manuals as the leading complaint among an average 880 customers phoning the vendors for help each month, the ministry said that it plans to establish guidelines for manufacturers that will enable them to write clearer manuals.

Seeking Seoul mates

Trigem Computer, Inc., which claims status as South Korea's only dedicated computer maker and leading microcomputer vendor, has been searching for an alliance to boost its fortunes in the U.S. market. Earlier this month, Trigem found its candidate. The Seoul-based firm's U.S. subsidiary, Santa Clara, Calif.-based **Trigem Corp.**, announced a long-term alliance with neighboring **CMS Enhancements, Inc.**, a $187 million PC enhancement products vendor. Terms of the agreement were not disclosed.

Mining for silver linings

Hard times in the **European electronics industry** show scant prospect of near-term improvement, according to a study released last week by Electronics International Corp., a New York-based research firm. The European electronics sector reported a $34.2 billion deficit in 1989; according to the report, the figure could reach $50 billion by 1995. The best hopes of reversing the downward trajectory, Electronics International said, lie in concentrating on telecommunications, computing and semiconductors — the three electronics sectors that bucked the trend and showed increases last year.

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Boss

CONTINUED FROM PAGE 117

"If the opportunity were right," said Sabey, who just completed his MBA at Brigham Young University, in Provo, Utah, "I'd want to work with [Macintosh] networks in corporate MIS."

No. 6: General Electric Co.: For Dahong "David" Qian, working for "the best" is a major reason he'd like to work for GE. Now studying for a master's degree in mechanical engineering at the University of Texas at Austin, Qian learned of the firm from his uncle, who is currently employed as a chemical engineer at GE in Albany, N.Y.

"He described it as an exciting place to work, where you are teamed up with senior employees, so you learn a lot. He says you are given the chance to achieve personal ambitions," Qian said.

No. 7: Motorola, Inc.: Anna Dorfman, a recent graduate of the University of Illinois, now works at Motorola as a programmer/analyst in the firm's Manufacturing Business Systems Division. Motorola's educational opportunities and international status were key for Dorfman.

Tuition reimbursement was high on Dorfman's list when looking for an employer. "I want my master's degree, and Motorola offers 100% paid tuition," she said. The global nature of the organization also attracted Dorfman's interest. "With different operations around the world, I would have the ability to move around," she said.

> "HE DESCRIBED [GE] as an exciting place to work, where you are teamed up with senior employees, so you learn a lot."
>
> DAHONG 'DAVID' QIAN
> UNIVERSITY OF TEXAS STUDENT

8: Arthur Andersen & Co./Andersen Consulting: Continued training is what Alan Yong was looking for in a new employer. In fact, Yong, a 1990 graduate with a bachelor's degree in business administration in MIS from the University of Oklahoma, said it is what he had in mind when he put Andersen Consulting on the top of his list.

"A good friend of mine working there, as well as a recruiter who came to our campus, described Andersen's training program as being the best in the business," Yong said.

Andersen's diverse business also attracted Yong. "Consulting," he said, "would provide me with the challenge of solving a variety of systems problems."

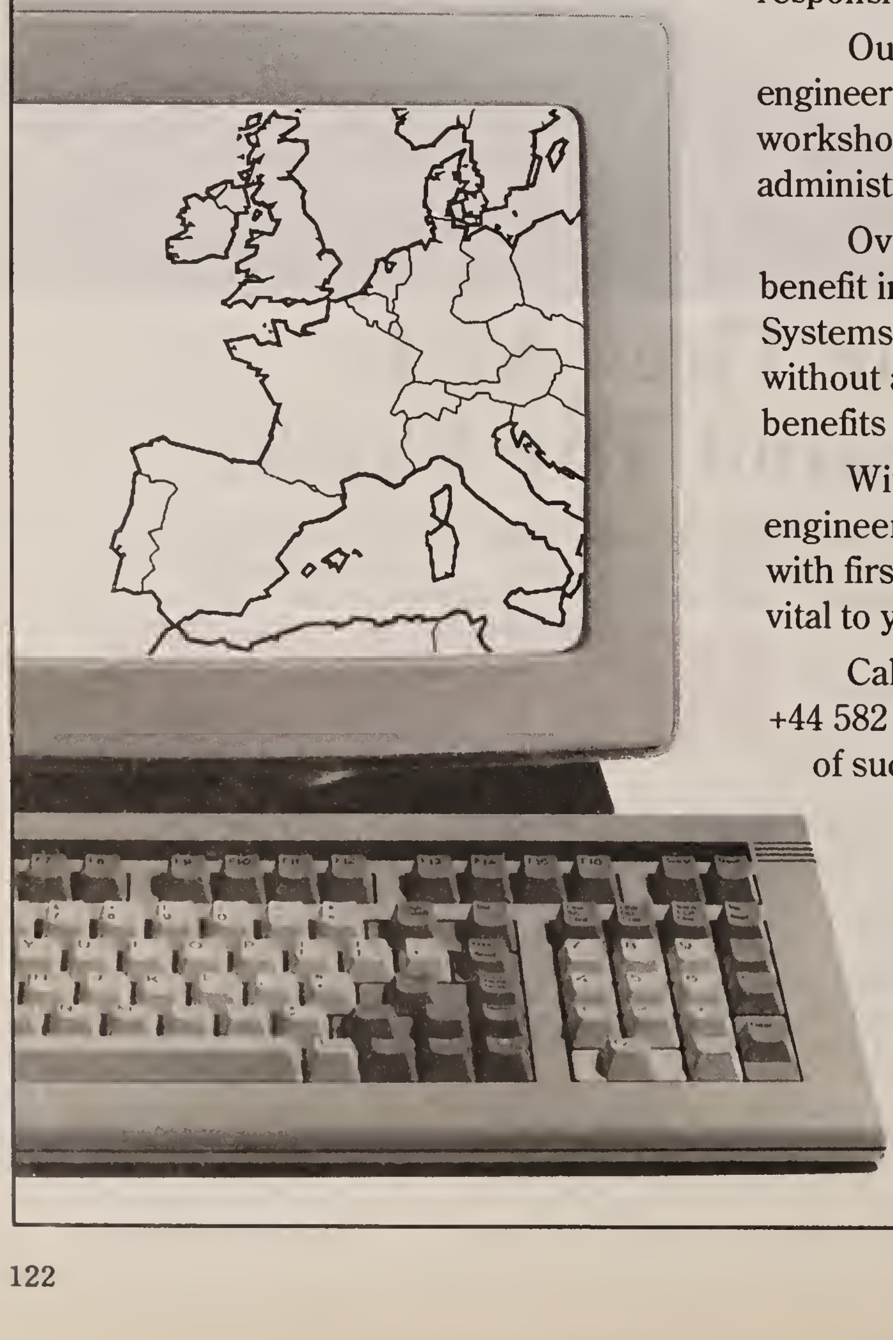
No. 9: Microsoft Corp.: "I've heard [that Microsoft has] a very laid-back technical environment where you get thrown right into a project, and it's easy for bright computer engineers to advance," said Victor Gerule, a 1990 University of Colorado computer science graduate.

"Each new student hire does have a tremendous amount of responsibility from day one," said Julie Walker, senior technical recruiting manager at Microsoft. "New employees can make an impact right up front, knowing that the product they've worked on will reach a market of millions of people," Walker said.

No. 10: Intel Corp.: The ability to blaze your own trail, said John Moore, program coordinator for corporate college recruitment at Intel, is luring students to Intel. "Supervisors may watch what you do, but you're given the opportunity to succeed, rather than looked upon as taking a risk to fail," he said.

Students are put to work on "very live projects," sometimes in the first week of employment, Moore said.

For Suber Patel, who is working on a master's degree in electrical engineering at the University of Wisconsin, attending an Intel open house brought that point home. He listened to speaker Ming Ling, who had graduated from the university the year before. "He was already one of the main product design engineers for the I860 chip," Patel observed.



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Top 10 big in technology biz

Interestingly, all of the top 10 companies targeted by the surveyed students are in some way directly involved with the business of technology. No banks, insurance firms or retail companies even made it to the Top 20. Hal Sullivant, president of system recruiting firm Linn-Truett, Inc. in San Antonio, said he believes this may be largely because of name recognition: Students, he said, are constantly bombarded with these companies' names and reputations while in school.

Ironically, well-known economic woes that have dogged the nation in general and the technology industry in particular are putting a crimp in recruitment at some of the very firms most avidly sought by students. That setback, however, appears to be both limited and temporary. For example, while No. 1 choice IBM has been hiring fewer college students this year to maintain its policy of no layoffs, college recruiting will be back up in 1991, according to Lee Covert, manager of IBM's national recruiting organization in Purchase, N.Y. The company is looking for hirees with bachelor's degrees in computer science, electrical engineering, mathematics, accounting and business.

AT&T's Gale Varma forecasted approximately 2,000 new college graduate hires in 1991, with an even mix of undergraduate and advanced degree students to be aimed at software development and systems engineering. Most college recruiting is done on campus; however, Varma said her office receives more than 200,000 inquiries per year.

At HP, Kathy Burke estimated that in 1991, 600 college students with degrees in computer science, electrical engineering, mechanical engineering, industrial engineering and MBAs will be hired.

Meanwhile, at GE, Randy Johnson anticipates that her company will hire approximately 80 students for the IS management program, the majority of whom will have bachelor's degrees in computer science, business or math.

GE's Edison engineering management program in Bridgeport, Conn., which requires students to have a degree in electrical or mechanical engineering, will have at least as many openings for graduates.

John Moore at Intel estimated that the company will look to hire approximately 400 students in 1991, half with undergraduate degrees and the rest with masters' degrees and Ph.D.s. Moore said he will be looking for graduates who have specialized in several disciplines, including electrical engineering, computer science, material science, chemical engineering, physics, finance and accounting.

SHERYL KAY

NCPA rates 100 best

Purveyors of computer hardware, software and services fared well in the latest annual update of "The 100 Best Companies to Work for in America," compiled by the National College Placement Association (NCPA).

In a diverse list that ranges from Massachusetts General Hospital to Taco Bell to the Tennessee Valley Authority, NCPA ranked 20 computer industry firms, such as Automatic Data Processing, Inc. and Teledyne Systems Co., as superior places to work.

Based on written questionnaires and telephone follow-ups, NCPA rated companies excellent, very good, good, average or below average in five categories: pay, benefits, job security, advancement potential and ambience. Pay and benefits were assessed relative to other companies in the same industry.

No computer firm rated at the top in all categories, but Microsoft Corp. came close with a very good rating in pay and an excellent in the other categories. And no computer firm ranked below good in any category except Intel Corp., which earned a below average rating for pay but balanced that with good or very good ratings in the other areas.

Small companies were found to be especially attractive. Computer Based Systems, Inc., a professional services firm with 400 employees, made the list, as did Cylink Corp., a maker of data encryption products that has 130 employees; KMS Fusion, Inc., a government contractor and rugged-computer maker with 230 employees; and Summa Four, Inc., an 85-person supplier of value-added systems.

Industry giants included Computer Sciences Corp., with 22,000 workers; National Semiconductor Corp., with 32,000 employees; and Tandy Corp./Radio Shack with 38,000 workers.

Others on the list included the business management services unit of Control Data Corp.; GE Consulting Services; Information International, Inc.; The Orkand Corp.; PRC Realty Systems, Inc.; Rolm Systems; Software Alternatives, Inc.; and Symantec Corp.

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Taking a gamble on the way to the top

BY SHERYL KAY
SPECIAL TO CW

Phyllis Singer moved from business analyst to corporate vice president at New York Life Insurance Co. in just two years — an impressive accomplishment for anyone. But Singer's dramatic career growth would not have come about without her willingness to risk challenging the status quo.

During Singer's stint as a business analyst, New York Life wanted to offer its clients new options across the board on its life insurance policy. What this meant for the information systems group was a complete system redesign — a task projected to take 120 man-months.

Singer spearheaded the solution. She met with all of the departments involved, took note of their concerns and recommended a system redesign that would take 30% less development time than the original IS estimate.

Her redesign involved using some of the existing programming fields and instituting some manual processing to get the system off the ground. The proposal was subsequently approved and implemented.

Singer is among a growing number of IS professionals who are recognizing that risk taking, individual initiative and independent research are keys to growth. In fact, professionals who exhibit these qualities may even zoom up the career ladder, attaining high-level positions well ahead of normal promotion cycles.

For example, Jim Welborne took a gamble several years ago that led him to a higher position within IS. He proposed a plan to automate Crowe, Chizek & Co., a Top-20 certified public accounting firm based in South Bend, Ind., by installing personal computers throughout the organization. He faced some high-level opposition, however: "The partner in charge was not turned on by the idea, especially because the initial outlay was $15,000, which constituted a full 15% of the IS budget for that year," Welborne says.

Thirteen years and 100 PCs later, however, Welborne is director of administrative services in IS and a senior manager at the firm — a position he credits in large part to the acceptance of his PC proposal.

In another example, the winning factor for Ken Anderson, formerly a systems analyst at Affiliated Computer Systems, Inc. in Dallas, was doing his homework. When the data communications department presented him with a rough draft for a new data center, he detected several shortcomings.

In response, he presented an alternative layout to upper management. Anderson's configuration called for discarding the original plan and putting in place a new one that would take two months and cost $35,000.

As a result, the proposal was accepted, and the data center was built according to Anderson's plan in October 1989.

"Because of Anderson's design, we now have total symmetry between the network, systems and operations — and a much better balanced system across all of our software nodes," says Royce Green, vice president of technical support and software systems at Affiliated Computer.

Anderson's reward? Greater credibility within the company and a promotion to manager of on-line systems and performance tuning.

Ivan Loffler at GTE Service Corp. in Tampa, Fla., also donned a creative cap to his company's benefit. As a senior technical analyst at the firm for several years, Loffler concluded that vendor press releases didn't always reflect accurate CPU power factors. "We were seeing a plus or minus 50% inaccuracy rate, which gave us great problems, particularly in capacity planning," he says.

After generating the needs analysis and the system's specifications, Loffler developed a representative benchmarking system in-house.

GTE offices across the nation still use this tool. "We've saved ourselves many times from vendors who might have overstated the power factor," says Loffler, currently the manager of technical evaluation at the company. Loffler says the benchmarking project advanced his career to where he is today.

The stories of these IS executives have a common theme: risk taking. Each of these people achieved career growth because they chose to be creative or challenge the way things were presented to them even though failure might have meant disaster.

To minimize risks, Anderson advises that IS professionals conduct careful research before suggesting something radical or different to management: "Make sure your idea will improve performance, efficiency and reliability and that, in the long run, it will be cost-effective," he says.

Once you have your idea thought out, Welborne suggests planting the first seed in the mind of the ultimate decision maker. Show the appropriate person a pertinent newspaper article, or bounce the idea off him or her casually. Then plan a lengthier meeting where you can present all the reasons that your idea is timely and appropriate for the company.

Finally, present a written proposal to the manager. "You don't want to start with the written proposal, because it's too impersonal," Welborne says. However, he adds, putting the plan down in writing will document your idea.

"If you're seen as being a forward thinker, it can only help your career, because technology is changing so rapidly every day. IS doesn't want to be caught up in doing things the same old way," Singer says.

Kay is a Tampa, Fla.-based business consultant and free-lance writer specializing in emerging technologies and human resources.

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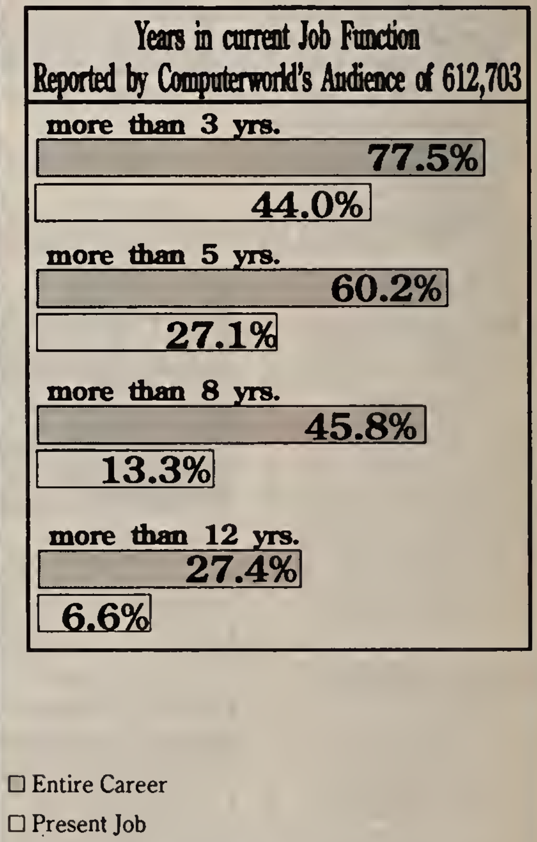

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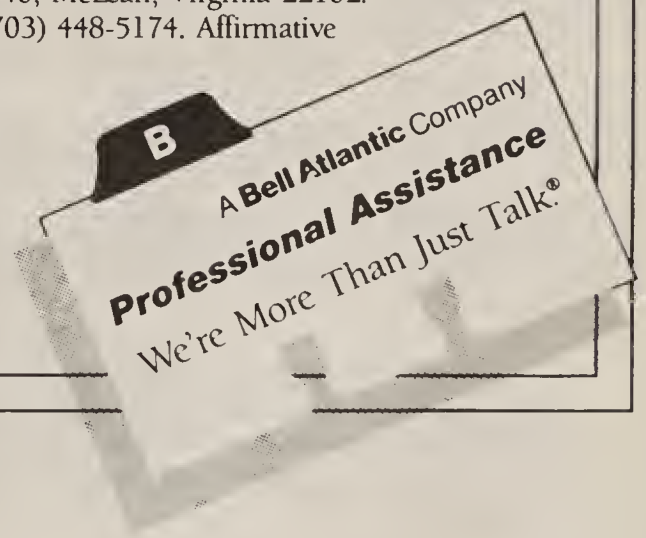

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Data encryption a vital step in keeping data secrets safe

BY SIMSON L. GARFINKEL
SPECIAL TO CW

If you think secret messages are just for James Bond and international spies, think again. If you are not using data encryption to protect financial or medical records or other confidential information stored in your computer, you may be putting that information at risk of tampering.

An encryption system is effective in protecting data on a disk and data being transmitted around the world. Encryption also reduces the chances of data being altered without your knowledge.

Encryption systems work by transforming a message into another message using a mathematical function and a special encryption password called the "key." If you encrypt the same message with two different keys, you get two different encrypted messages. If the encryption system is good, it is nearly impossible to translate the encrypted message back into the original message without knowing the key.

"Oil companies use it for transmitting oil exploration data from the oil well back to the main computer," says Samuel S. Wagstaff, a professor of computer science at Purdue University. "They don't want [their competitors] to benefit from the information."

Layers of protection

Encryption provides additional layers of protection for computers shared by many users. Unauthorized users may be able to access files, but if they don't know the key used to encrypt the files, it won't do them any good.

For this reason, encryption also protects data from being tampered with, says Dorothy Denning, a computer security expert at Digital Equipment Corp.'s Software Research Center in Palo Alto, Calif. Even if attackers manage to bypass your computer's security system, they won't be able to view confidential information without the encryption key. Although the attackers may be able to delete files, they can't forge encrypted documents because the forged documents won't decrypt properly.

Because encryption thwarts data tampering, it's also used for financial transactions transmitted over vulnerable channels, Denning says. Furthermore, she says, encryption can protect programs from attack by viruses. A virus that modifies an encrypted program won't run after the program is decrypted.

There are currently two basic types of encryption systems in use: "private key" and "public key" systems. Private-key encryption uses the same password to encrypt and decrypt the message. One of the most common private-key encryption systems is the Data Encryption Standard, better known as DES, developed by IBM in the 1970s.

Public-key encryption uses one key to encrypt a message (called the public key) and another key to decrypt the message. One of the most popular public key systems is RSA (for its creators, Rivest, Shamir and Adleman), which uses keys calculated from prime numbers that are hundreds of digits long.

There are a variety of encryption products on the market today. Some are programs that automatically encrypt data when it is saved onto disk and that decrypt it when the data is loaded back into an application program. Other programs are stand-alone and must be run in a separate step, leaving the decrypted data on the computer's hard disk. Some systems use special-purpose encryption hardware to speed the encryption process. Encrypting modems are also available and can be set to automatically encrypt everything sent over a telephone line.

Picking an encryption system is complicated by the fact that none is perfect: every system can be broken, according to Wagstaff. "Some of them can be broken in one or two days, some may take 100 years. Some can be broken for $1,000, while some of them might cost a billion dollars to break. You have to estimate the power of your enemy and how much power your enemy is willing to spend to break your cipher," he says.

Extra power needed

Encryption is not without its problems, however. It takes time and computer power to encipher and decipher a message. Generally, the more secure the encryption system, the longer it takes.

Another danger is forgetting your key. If your encryption system is any good, losing your key means that you've also lost your data.

Encryption software is fundamentally different than other applications. With a spreadsheet or a word processor, it's easy to tell if the program is functioning properly. But if you're not a cryptography expert, how do you tell if a proprietary encryption algorithm is easy to break?

Cryptologia magazine published articles in 1987 demonstrating the ease of cracking the encryption systems used by several popular IBM Personal Computer programs. "I've seen enough encryption schemes cracked that I would be very suspicious of a proprietary one," Denning says. Instead, she adds, companies should rely on well-known and well-tested systems such as DES and RSA.

Garfinkel is a free-lance writer and computer consultant based in Cambridge, Mass.

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XT Model 086	$500	$550	$450
XT Model 089	$550	$625	$400
AT Model 099	$650	$975	$500
AT Model 239	$875	$1,025	$750
AT Model 339	$925	$1,100	$900
PS/2 Model 30-286	$1,250	$1,300	$1,125
PS/2 Model 60	$1,500	$1,800	$1,400
PS/2 Model 70P	$3,425	$3,450	$3,175
Compaq Portable II	$900	$1,050	$875
Portable 286	$1,275	$1,450	$1,100
SLT 286	$2,500	$2,625	$2,000
Portable 386	$2,600	$2,800	$2,500
LTE 286	$2,000	$2,100	$1,850
Deskpro 286	$1,175	$1,400	$1,100
Deskpro 386/20	$2,900	$3,100	$2,400
Apple Macintosh Plus	$750	$975	$700
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TRAINING

Ergonomics awareness piques

But should IS be more involved in preventive training?

BY LISA GUISBOND
SPECIAL TO CW

After a decade of conflicting claims and confusing data regarding computer-related ailments, one thing is clear: Even the most costly "ergonomically correct" equipment and furniture are of little help if users are not trained to use them properly.

While human resources departments have traditionally handled ergonomics issues, ergonomics experts see an important role for information systems in formulating preventive training programs.

Undeniably, everyone who works with computers is paying attention to reports on cumulative trauma disorders (CTD), which occur in occupations such as data entry and journalism, where repetitive tasks such as keyboard strokes place stress on the hands and wrists.

Pain in the keyboard

Carpal Tunnel Syndrome — the most well-known of these disorders — often begins with burning, aching pains at night and can cause paralysis and atrophy of the thumb muscles in later stages. Less dramatic but more common are back and neck injuries — caused not only by repetitive tasks but also by improper height of desks, chairs, keyboards and screens — which cause serious discomfort but do not usually disable the sufferer.

Examples such as Mountain Bell (where 140 cases of CTDs have been reported among 500 directory assistance operators) and the New York newspaper *Newsday* (where as many as 40% of employees have complained of CTD symptoms, and a liability suit has been initiated against the maker of their keyboards) are causing many businesses to take notice. Beyond these examples, there are estimates from a variety of medical experts for treating CTD injuries beginning at $3,000 per worker per year — double that if surgery is required.

Gary Niekerk, director of health and safety at Apple Computer, Inc., sees a strong role for IS in ergonomic issues. While IS personnel are not yet involved in this area, he says that they could enhance their value to their organization if they could offer some guidance and counsel on how to set up an ergonomically correct work area.

Although Apple had just a few reported cases of CTD-related injuries, it decided to create its own training program, Niekerk says. The company began identifying key user groups before bringing in a consultant to help establish a training program.

The program includes a 20-minute general talk for new employees on environmental health and safety that emphasizes the importance of setting up a work area properly. If workers request additional information, they are given the opportunity to take a class that focuses on issues of cumulative musculoskeletal problems and eyestrain. The class also deals with VDT radiation, a specific concern for many people, particularly pregnant women.

Niekerk is now developing a training video to sensitize managers to the work patterns that can lead to or exacerbate CTDs. "You don't want a manager to say, 'Hey, I'm interested in any problems you have physically, but we do need you to work 15 hours a day for the next week, every day, and Saturday and Sunday.' There's some kind of conflicting message there," he says.

Tom Signore, an occupational ergonomist at Raychem Corp. in Menlo Park, Calif., and an independent consultant, says he also believes there should be more of a connection between IS and ergonomics. "If you are designing a computer system, you had better take a look at the people who interface with it and make sure that the interface is a smooth one — both from an efficiency standpoint and a health and safety standpoint. If [IS is] not looking at it, they're missing the boat," he says.

However, IS hasn't quite hopped on that boat yet. Gerald Siddons, director of scientific computing at the division of biostatistics and epidemiology at Dana-Farber Cancer Institute, sees a lack of initiative on the part of IS to participate in ergonomics issues — and he includes himself in that assessment. "I'm a good example of someone who pays lip service but then doesn't do anything about it," he said. Nonetheless, Siddons thinks ergonomics is a genuine area for IS concern.

While IS isn't yet dedicated to the ergonomics effort, other people in health and safety positions are. Mike Manfro, safety and environmental affairs manager at *The Los Angeles Times,* has been engaged in a six-year effort to reduce VDT-related injuries and is now participating in a comprehensive National Institute of Occupational Safety and Health study of the problem involving 1,000 *L.A. Times* workers. He agrees that training is key to preventing injuries.

With the help of an ergonomics consultant, the *L.A. Times* has developed a training video and instructional booklet on setting up equipment and injury-prevention exercises. The video and booklet direct employees on how to adjust their screens, keyboards, chairs and tables to the appropriate heights for their bodies and details stretching exercises.

Professional help

For those interested in more information on ergonomics, Signore recommends contacting a university with an established ergonomics department, such as the University of Michigan (where Signore obtained his master's degree in industrial engineering), to ask for referrals.

Other resources include the American Industrial Hygiene Association and the Human Factors Society in Santa Monica, Calif.

Computer-related ailments have also spurred the growth of an ergonomics consulting industry. These consultants can be brought in to help companies evaluate and correct working conditions that can lead to costly injuries and staff downtime.

Guisbond is a free-lance writer based in Cambridge, Mass.

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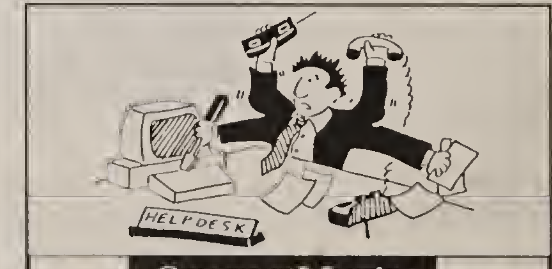

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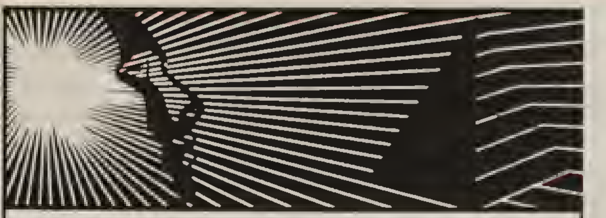

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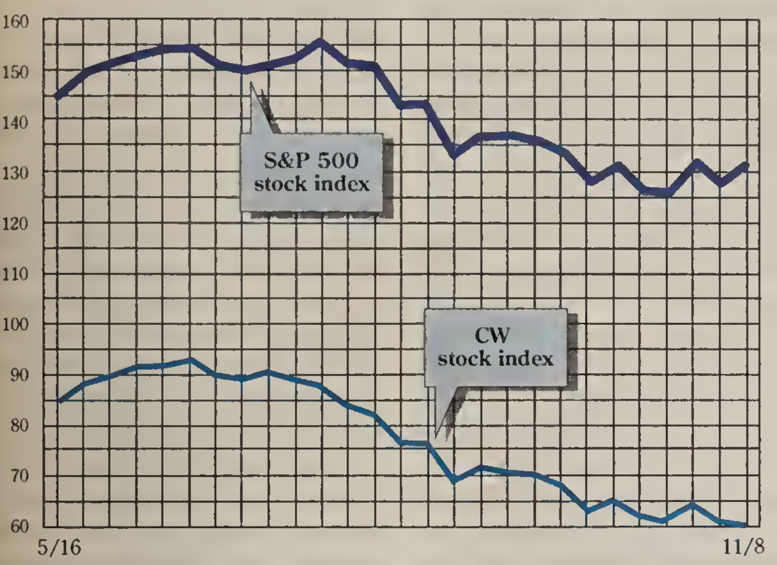

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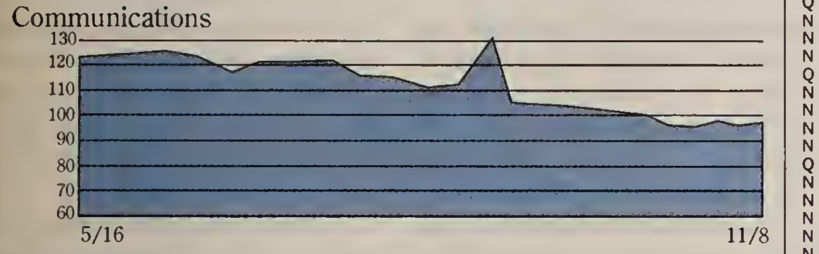

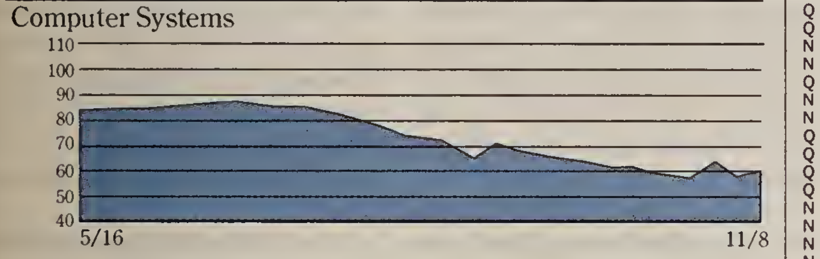

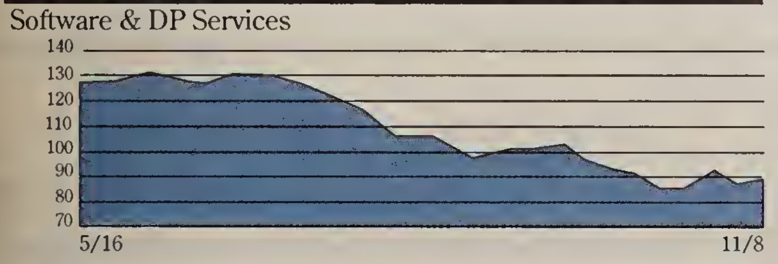

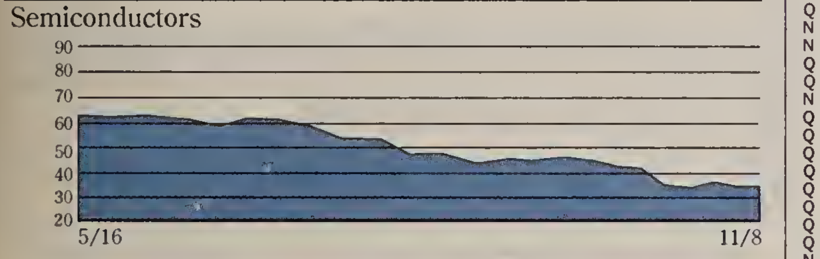

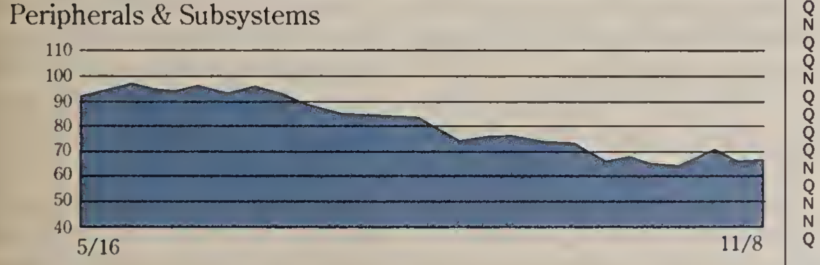

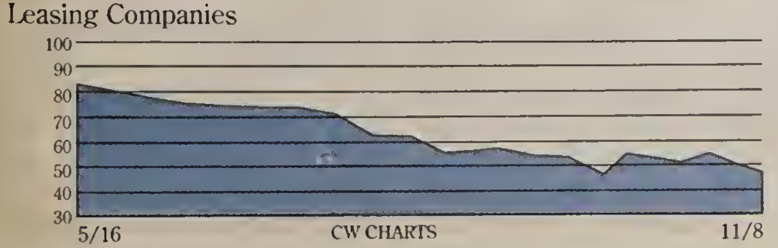

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Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, OCT. 7, 1990

EXCH		PRICE				
		52-WEEK RANGE		CLOSE OCT. 7, 1990	WEEK NET CHNGE	WEEK PCT CHNGE
	Communications and Network Services					
N	AMERICAN INFO TECHS CORP	68	53	64.25	-1.5	-2.3
Q	ANDREW CORP	26	16	17.5	0.5	2.9
Q	ARTEL COMM CORP	10	2	2.75	0.3	10.0
N	AT&T	47	30	33.625	-0.4	-1.1
Q	AVANTEK INC	5	2	1.875	0.3	15.4
N	AYDIN CORP	19	10	10.25	-0.5	-4.7
N	8ELL ATLANTIC CORP	57	40	50.375	-1.9	-3.6
N	8ELLSOUTH CORP	59	49	52.875	0.1	0.2
Q	COMPRESSION LA8S INC	16	7	11.875	-2.4	-16.7
Q	CONTEL CORP	36	23	33.375	-0.1	-0.4
Q	OATA SWITCH CORP	4	2	3	0.0	0.0
Q	OIGITAL COMM ASSOC	27	9	10.125	0.5	5.2
Q	OYNATECH CORP	19	12	15.75	0.8	5.0
Q	FIBRONICS INTNL INC	13	5	7.25	0.0	0.0
Q	GANOALF TECHNOLOGIES	6	2	2.75	0.4	15.8
N	GENERAL DATACOMM INDS	5	2	1.875	0.3	15.4
N	GTE CORP	36	24	28.125	-0.1	-0.4
Q	INFOTRON SYS CORP	9	1	1	-0.8	-42.9
N	ITT CORP	61	40	46	2.9	6.7
N	M A COM INC	6	3	4.5	0.1	2.9
Q	MCI COMMUNICATIONS CORP	48	28	30.125	0.1	0.4
N	NETWORK EQUIP TECH INC	34	5	5.375	0.0	0.0
Q	NETWORK SYS CORP	15	8	8.625	0.3	3.0
N	NORTHERN TELECOM LTO	30	21	25.875	-0.5	-1.9
Q	NOVELL INC	29	12	27	2.3	9.1
N	NYNEX CORP	92	67	69.625	1.6	2.4
N	PACIFIC TELESIS GROUP	52	36	44.625	-0.4	-0.8
A	PENRIL CORP	9	5	6.25	0.5	8.7
N	SCIENTIFIC ATLANTA INC	29	9	9.5	-0.1	-1.3
N	SOUTHWESTERN 8ELL CORP	65	47	55	0.5	0.9
Q	3 COM CORP	19	5	7.125	0.3	3.6
N	U S WEST INC	41	32	36.625	-0.4	-1.0
	Computer Systems					
Q	ALLIANT COMPUTER SYS	9	1	1.25	-0.1	-9.1
Q	ALPHA MICROSYSTEMS	5	1	1.625	0.0	0.0
Q	ALTOS COMPUTER SYS	8	5	8.25	0.0	0.0
A	AMOAHL CORP	19	10	11.875	0.5	4.4
Q	APPLE COMPUTER INC	48	24	33.25	2.5	8.1
Q	AST RESH INC	26	9	23.5	2.8	13.3
N	8OLT 8ERANEK & NEWMAN	8	4	4.625	-0.1	-2.6
N	COMPAQ COMPUTER CORP	68	36	46.375	-0.3	-0.5
N	COMMODORE INTNL	12	5	6.875	-0.5	-6.8
Q	COMPUTER AUTOMATION INC	6	0	1.125	0.1	9.0
N	CONTROL OATA CORP	22	8	9.25	1.0	12.1
N	CRAY RESH INC	51	20	25.25	1.6	6.9
N	OATA GEN CORP	14	4	4.125	-0.1	-2.9
N	OATAPOINT CORP	5	1	1.375	0.1	10.0
Q	OELL COMPUTER CORP	14	5	11.25	0.6	5.9
N	OIGITAL EQUIP CORP	95	46	47.5	0.0	0.0
N	FLOATING POINT SYS INC	4	0	1.25	-0.1	-9.1
N	HARRIS CORP	36	14	16.5	1.5	10.0
N	HEWLETT PACKARO CO	50	25	25.125	-0.9	-3.4
N	HONEYWELL INC	112	71	86.75	4.1	5.0
N	I8M	123	93	106.5	1.0	0.9
Q	INFORMATION INTL INC	14	8	8.75	-0.5	-5.4
Q	IPL SYS INC	14	5	9.125	0.3	2.8
N	MAI BASIC FOUR INC	4	1	1	-0.1	-11.1
N	MATSUSHITA ELEC INOL LTO	166	116	126.5	-9.3	-6.8
Q	MENTOR GRAPHICS CORP	26	9	10.75	1.1	11.7
N	NBI INC	1	0	0.141	0.0	-9.6
N	NCR CORP	72	45	48	0.8	1.6
Q	PYRAMIO TECHNOLOGY	36	12	14.5	1.0	7.4
Q	SEQUENT COMP SYS INC	34	13	17	1.0	6.3
Q	SUN MICROSYSTEM INC	37	15	17.625	1.6	10.2
Q	SYM8OLICS INC	2	0	0.281	0.0	-10.2
N	TANOEM COMPUTERS INC	30	9	10.25	0.9	9.3
N	TANOY CORP	44	24	24.375	0.5	2.1
N	ULTIMATE CORP	10	2	2	0.0	0.0
N	UNISYS CORP	17	2	2.875	0.6	27.8
A	WANG LA8S INC	6	3	2.75	-0.1	-4.3
	Software & DP Services					
Q	AMERICAN MGMT SYS INC	20	11	14.625	0.4	2.6
Q	AMERICAN SOFTWARE INC	18	8	10.375	0.4	3.8
N	ANACOMP INC	5	1	2	-0.1	-5.9
Q	ANALYSTS INTL CORP	24	10	12.5	0.3	2.0
Q	ASHTON TATE	15	5	7	0.3	3.7
N	AUTO OATA PROCESSING	60	45	51	0.6	1.2
Q	AUTOOESK INC	60	32	40.75	2.5	6.5
Q	BMC SOFTWARE INC	30	17	19.625	-0.1	-0.6
N	BUSINESSLANO INC	12	1	1.5	-0.3	-14.3
Q	COGNOS INC	10	4	7.5	0.9	13.2
N	COMPUTER ASSOC INTL INC	17	4	7	0.0	0.0
Q	COMPUTER HORIZONS CORP	17	8	12.75	-0.4	-2.9
N	COMPUTER SCIENCES CORP	59	37	44	1.4	3.2
N	COMPUTER TASK GROUP INC	12	7	7.125	-0.3	-3.4
Q	COMSHARE INC	25	14	17.25	0.3	1.5
Q	CORPORATE SOFTWARE	16	4	4.75	0.3	5.6
N	GENERAL MTRS (CLS E)	38	24	32.5	-0.1	-0.4
Q	GOAL SYSTEMS INTL	18	8	8.50	0.8	10.4
Q	HOGAN SYS INC	7	2	2.375	0.3	11.8
Q	INFORMIX CORP	18	4	4	0.4	10.3
Q	INTELLICORP INC	8	1	1.75	0.1	3.7
Q	LEGENT CORP	31	17	19.375	1.1	6.2
Q	LOTUS OEV CORP	39	13	18.625	1.4	8.0
Q	MICROSOFT CORP	81	38	63.75	0.0	0.0
Q	NATIONAL OATA CORP	35	8	11	0.9	8.6
N	ON LINE SOFTWARE INTL INC	11	4	4	-0.3	-5.9
Q	ORACLE SYS CORP	188	5	5.625	0.3	4.7
N	PANSOPHIC SYS INC	19	7	7.375	-0.4	-4.8
Q	PHOENIX TECHNOLOGIES INC	5	2	1.625	-0.1	-7.1
N	POLICY MGMT SYS CORP	43	30	36.25	-1.4	-3.7
Q	PROGRAMMING & SYS INC	25	9	10.75	0.8	7.5
Q	RELATIONAL TECH INC	10	3	9.125	0.0	0.0
N	REYNOLOS & REYNOLDS CO	27	12	13	1.3	10.6
Q	SAGE SOFTWARE INC	16	8	9.875	-0.6	-6.0
Q	SEI CORP	22	15	16	0.0	0.0
Q	SHAREO MEO SYS CORP	17	12	15.25	0.0	0.0
Q	SOFTWARE PUBG CORP	28	12	15.25	1.8	13.0
N	STERLING SOFTWARE INC	11	6	6.875	-0.1	-1.8
Q	SUNGARO OATA SYS INC	26	10	11.375	0.9	8.3
N	SYSTEM CENTER INC	25	6	7.125	-0.5	-6.6
N	SYS. SOFT INC	29	13	20.5	1.3	6.5
Q	WOROSTAR	2	1	1.063	0.1	6.3
	Semiconductors					
N	AOV MICRO OEVICES INC	11	4	3.75	-0.1	-3.2
N	ANALOG OEVICES INC	10	6	5.75	0.0	0.0
Q	ANALOGIC CORP	10	8	8.375	-0.1	-1.5
Q	CHIPS & TECHNOLOGIES INC	24	5	6.25	0.3	4.2
Q	INTEL CORP	52	28	34.5	1.0	3.0
Q	MICRON TECHNOLOGY INC	16	7	7.375	-0.5	-6.3
N	MOTOROLA INC	88	51	55	1.1	2.1
N	NATL SEMICONOUCTOR	9	3	3.75	0.4	11.1
N	TEXAS INSTRS INC	44	23	25.75	1.8	7.3
A	WESTERN OIGITAL CORP	15	5	5.125	-0.5	-8.9
	Peripherals					
Q	ALLOY COMP	2	0	0.25	-0.3	-50.0
N	AM INTL INC	6	1	1.5	0.5	50.0
Q	AUTO TROL TECH CORP	4	2	2.063	0.1	3.2
Q	8ANCTEC INC	24	10	11	0.5	4.8
A	COGNITRONICS CORP	7	3	5.375	0.1	2.4
Q	CONNER PERIPHERALS	31	11	21.875	-1.3	-5.4
A	DATARAM CORP	22	8	8.188	-0.1	-0.8
N	EASTMAN KODAK CO	44	34	38.875	-0.9	-2.2
N	E M C CORP MASS	8	3	7.25	0.5	7.4
Q	EMULEX CORP	9	4	5	0.1	2.6
Q	EVANS & SUTHERLANO	35	14	15.5	-1.0	-6.1
Q	ICOT CORP	2	0	0.563	0.1	12.6
Q	INTERLEAF INC	8	3	3.25	0.0	0.0
Q	IOMEGA CORP	6	3	4.063	0.0	0.0
Q	MASSTOR SYS CORP	3	0	0.313	-0.3	-44.4
Q	MAXTOR CORP	17	4	4.625	-0.1	-2.6
Q	MICROPOLIS CORP	10	3	5.75	0.3	4.5
N	MINNESOTA MNG & MFG CO	91	73	78.875	-0.1	-0.2
Q	PERSONAL COMP PROOUCTS INC	5	4	3.625	-0.1	-3.3
Q	PRINTRONIX INC	15	6	8.375	-0.2	-2.2
N	QMS INC	21	9	11.25	-0.6	-5.3
Q	QUANTUM CORP	26	9	18.25	-0.1	-0.7
N	RECOGNITION EQUIP INC	8	4	5	0.0	0.0
Q	REXON INC	10	4	5.625	-0.4	-6.3
Q	SEAGATE TECHNOLOGY	20	6	8.75	1.4	18.6
N	STORAGE TECH CORP	35	11	15.875	2.0	14.4
Q	TANOON CORP	4	1	1.688	0.0	0.0
N	TEKTRONIX INC	19	12	16	0.8	4.9
Q	TELEVIOEO SYS INC	1	0	0.25	0.0	0.0
N	XEROX CORP	60	29	31.125	1.6	5.5
	Leasing Companies					
N	CAPITAL ASSOC INTNL INC	5	1	0.625	-0.3	-28.6
N	COMOISCO INC	30	15	15.625	-0.4	-2.3
Q	LDI CORPORATION	18	10	10	-0.3	-2.4
Q	PHOENIX AMERN INC	5	3	4.625	-0.1	-2.6
Q	SELECTERM INC	7	3	2.75	-0.3	-8.3

EXCH: N = NEW YORK; A = AMERICAN; Q = NATIONAL

War spoils

Rumors of action in the Middle East stifle trading

Forget that image of Wall Street as a near-riotous mass of people screaming above the din of money-changing hands. Wall Street responds best to whispers. And hazy government statements sure fan the fires of hearsay. Reports of a stepped-up offensive in the Middle East — but no declaration of any change in policy — made traders nervous last week, an apprehension reflected in the bitsy movements of technology stocks.

Take semiconductor firms, for example. After Intel Corp. put out its new multimedia chip, its share price crept up just ¼ of a point last week to close Thursday at 35¼. As it let customers preview its new 16M-bit memory chip, Texas Instruments, Inc. dipped ½ of a point to 25½. Scuttlebutt from analysts last week put Motorola, Inc. in poor financial standing for the quarter and drove the company's shares down 3½ points to 54¼.

Reported closed-door talks between AT&T and NCR Corp. had traders abuzz with stories of acquisitions, mergers and every other kind of possible agreement between the two hardware makers. AT&T dropped 1⅝ points to 33⅛ as NCR zoomed up 5½ points to 53⅞.

After introducing its new Sparcstation 2 workstation, Sun Microsystems, Inc. improved its standing by 1 point, closing at 17⅞. Apple Computer, Inc. shot up 2¾ points to 34½. Bellwethers IBM and Digital Equipment Corp. slipped slightly: IBM lost ⅞ of a point, falling to 107½, while DEC was down ⅜ of a point to 48⅜.

Among software concerns, Microsoft Corp. fell 1½ points to 63½, as Autodesk, Inc. and Oracle Systems Corp. each advanced by ⅛ of a point, to 41½ and 5¾, respectively. Boole and Babbage, Inc. posted quarterly revenue up but profit down; its stock price slipped ½ of a notch to close at 12¾. Lotus Development Corp. remained unchanged at 18½.

KIM S. NASH

NEWS SHORTS

Corrigan heads IBM Entry Systems

IBM named Robert J. Corrigan as president of IBM Entry Systems Division late last week. Corrigan, former president of the IBM Systems Technology Division's technology products line of business, will report to James A. Cannavino, IBM vice president and general manager of the Personal Systems line of business. In a related announcement, IBM Vice President Lutz F. Hahne was named to succeed Corrigan.

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Encryption for FTS 2000

The U.S. General Services Administration (GSA) won approval from an interagency panel last week to proceed with an ambitious plan to offer data encryption services to more than one million users of the new Federal Telecommunications System 2000. GSA plans to offer two levels of end-to-end encryption over packet-switched networks, one for sensitive but unclassified data and another for classified traffic.

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3Com eyes optics

Networking company 3Com Corp. is hinting that a new alliance could result in a write-once read-many device bundled into 3+Open systems. 3Com announced last week that it will codevelop memory backup systems with Naperville, Ill.-based Palindrome Corp. The products will run on Microsoft Corp.'s LAN Manager network operating system. Gordon Smith, product line manager for 3Servers and 3Stations, refused to say whether 3Com will work on optical media. Smith did say that "the next logical step would be to move beyond tape."

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Leasing push at Amdahl

Amdahl Corp. said last week it will step up the use of an inhouse leasing group to provide financing for Amdahl mainframes in the U.S. The move is not intended to stem third-party leasing of Amdahl machines, the firm said. The news came at Amdahl's quarterly meeting with industry analysts. However, some Amdahl customers were notified of the change several weeks ago. The leasing arm, Amdahl Capital Corp., was created in 1978 but has been relatively quiet in recent years.

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Ask, Ingres job cuts

As expected, Ask Computer Systems, Inc. terminated 15% of its work force at Ingres Corp. last week. Ingres is an Alameda, Calif.-based database software company that Ask acquired on Oct. 29. Ask said it had eliminated 270 positions from the combined company's work force, including an unspecified number of positions at Ask. Before the merger, Ingres had 1,200 employees; Ask had about 900 employees.

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Gupta with multiple introductions

Gupta Technologies, Inc. last week announced that it will ship Version 2.0 of its SQL Windows product along with its SQLbase Server Version 4.1 on Nov. 30. The company confirmed earlier reports that SQLbase 4.1 will address bugs users found in Version 4.0. For example, it will offer cursor context preservation, allowing developers to create multiwindowed browsing and scrolling applications more easily. Gupta also announced a version of SQLnetwork for IBM DB2 that does not require IBM CICS.

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Tiger attacks Adapso attendee

An elaborate prank turned ugly at last week's Adapso conference in Scottsdale, Ariz., when an attendee was injured by a 450-pound Bengal tiger. Adele S. Kalis was listed in good condition at a local hospital after she was scratched and bitten in the leg by a tiger that was to have been used by John Imlay, chairman of Dun & Bradstreet Software, in a roast staged in his honor that evening. In business news at Adapso, the association announced plans to merge with the newly formed Software Business Practices Council [CW, Oct. 22], which is working to improve the ethical standards of the software industry. Adapso's directors also voted to rename their organization the Information Technology Association.

Dbase IV fast losing credence

BY JAMES DALY
CW STAFF

LAS VEGAS — Many Ashton-Tate Corp. users attending this week's Comdex/Fall '90 trade show will pound the pavement looking for a product, that, although it has been continually promised, remains harder to get your hands on than a royal flush.

Two years ago, Ashton-Tate officials announced Dbase IV Version 1.1's Professional Compiler, a device sorely needed by users anxious to port the best-selling Dbase IV database application to a variety of different processors and operating systems within their shops.

Since then, however, Ashton-Tate officials have been poker-faced about an arrival date for the compiler — and users are getting frustrated. "I need it, and I'm ready for it. I just haven't seen it," said Jack Bradford, a programmer at the Minnesota Department of Natural Resources in Minneapolis.

Ashton-Tate will give an advanced peek at the compiler at the show, and beta-test versions have been promised by President Bill Lyons by the end of the year, but the delay is not sitting well with users who need the product now.

Particularly antsy are those who hung tough with the company between the time it released the bug-laden Dbase IV Version 1.0 two years ago and the release of the improved Version 1.1 in late July. They feel the company owes them an explanation and has not done a good job of clearing the air about the increasingly mysterious compiler.

"It's very unsettling. What can be that wrong with it to cause this delay?" asked Bill Campbell, systems consultant at South Carolina Water Resources in Columbia, S.C.

Some industry analysts said the wait for a general release of the compiler could still be another eight months or a year away. Why the holdup? Ashton-Tate officials were unavailable for comment on this point, but some users said they were told that early Microsoft Corp. software libraries originally targeted for the compiler were scrapped for libraries of Ashton-Tate's design.

To satisfy their compiler needs during the waiting game, some users headed over to products such as Fox Software, Inc.'s Foxbase and Nantucket Corp.'s Clipper, which are actually interpreters but can also perform compiler duties.

"If I sat here and waited for Ashton-Tate to give me a usable product, I would have been out of business," said Pat Adams, president of DB Unlimited, a consulting firm in Brooklyn, N.Y. "My loyalty is to my business and my clients, not any particular company."

SPA

FROM PAGE 1

and explaining the legal consequences of not buying registered software. In some cases, the SPA will request permission to audit a company.

Lawsuits are only filed against large companies or particularly egregious offenders. In the case of the company that will be raided this week, Burek said, "We feel that the company may make an attempt to clean up their act [if we notified them], and we'd rather nail them."

A search-and-seizure notice can only be granted by a judge when a suit is filed alleging software piracy. During the past two weeks, the SPA has filed six cases against companies it accused of pirating software. This week it may file two more.

With last month's actions by the U.S. Congress to create a new law banning software rentals and lifting a shield that had exempted institutions and employees of the 50 states from copyright infringement damages [CW, Nov. 5], the SPA's litigation folder could expand greatly in the near future.

Although the SPA has conducted fewer than 10 search-and-seizure efforts in its two-year battle against software pirates, they have been fruitful.

In May, the SPA raided the three campuses of the National Business Academy, a software training school headquartered in Van Nuys, Calif., that teaches classes on Microsoft Corp.'s DOS, Wordperfect Corp.'s Wordperfect and Lotus Development Corp.'s 1-2-3.

That raid netted 600 allegedly pirated copies of software worth $250,000 from just one location. The SPA said it is negotiating a settlement with the Academy over the $2.5 million in software it believes the school has pirated.

The May raid stemmed from evidence found in four affidavits, including those of two students and a teacher at the school, and represents the single biggest action the SPA has taken in its two-year crackdown on software pirates.

Raids obviously have the potential to disrupt an entire company's business while it attempts to replace its software, but SPA executive director Ken Wasch defended the policy.

Audit trail

Since 1988, the Software Publishers Association has taken the following actions in its campaign against illegal copying

1. Sent more than 300 cease-and-desist letters
2. Conducted more than 50 audits (program started in 1989)
3. Collected $1 million-plus in penalties
4. Generated $5 million to $10 million in additional sales from court cases
5. Distributed 10,000 copies of self-auditing kit
6. Filed 60 suits
7. Received an average of 20 calls per day on its toll-free line

Source: Software Publishers Association

CW Chart: Doreen St. John

"We reserve hardball tactics for those people who deserve it," Wasch said. "By and large, our program is pro-user, and thousands upon thousands of large corporate users apparently appreciate our efforts" in providing such antipirate kits as Spaudit, a package that clearly details what pirating is and helps MIS directors ensure that their machines are clean.

"Our greatest ally in all this is the MIS manager," Wasch said. "They're stuck in the middle, and they tell me that we're a godsend, that we help them get the message through to their management or their end users."

Julian Horwich, executive director of the Chicago Association for Microcomputer Professionals (CAMP), agreed with Wasch that microcomputer managers do appreciate the SPA. CAMP members, he said, "have talked about it and I think favorably."

The MIS director at a firm that settled with the SPA and the president of a small company that recently received a cease-and-desist letter from the SPA both said that the SPA was doing something positive.

The company president, who requested not to be identified, did say that "we have to spend five or six grand, and that's a lot of money. This would've killed us if it had happened a couple of years ago."

It would cost far more if the SPA came calling, Wasch said, noting that within the next month, it is likely that a 20-PC site will be raided as well.

Upgrade-itis

CONTINUED FROM PAGE 1

Ron Adinolfi, vice president of enterprise decision support at Swiss Bank Corp. "A maintenance contract would sure make life a lot easier."

Alternatively, support for an industry-standard upgrade policy of some stripe has emerged among some users and at least one distributor.

"I'd like to see a fill-in-the-blank upgrade announcement sheet where the developer is compelled to say, 'These are the major and obscure fixes and bugs,' " said Brian Illari, an assistant vice president at Citicorp Global Finance NA.

Users have long complained that some upgrades are actually bug fixes. Now they are finding that controlling and managing a constant stream of upgrades for multiple systems is time-consuming and usually expensive.

In part, what is driving the trend toward upgrades is the tendency of developers to release products they know have problems, expecting to ship a maintenance disk a month later, complained Brian Livingston, an independent network consultant, echoing similar comments from other users.

It can take six months to a year to thoroughly test, approve, purchase and install an upgrade (see story below), Livingston said. "This causes intense problems for sites with hundreds or thousands of PCs."

With that in mind, most of the users agreed on the following caveats:

- Major upgrades should be a minimum of one year apart and as far as two years apart.
- Users should not have to pay for any bug fixes nor should they have to pay for minor upgrades released, at a minimum, within six months after the initial ship. A large number of users would extend that period to a year.
- Users should be given fair warning before support for a specific version is withdrawn.
- Acceptable upgrade costs would range from $10 to $50. "At user group meetings, when someone mentions a new product, the first question is, 'How much is the upgrade?' It's an issue," said David Blumenstein, a spokesman for the New York PC Users Group.

Vendors, however, are increasingly forced to rely upon upgrade sales to fill their coffers, and many view their individual upgrade policies as part of their competitive mix.

Reaping upgrade revenue

Jeffrey Tarter, publisher of the "Soft Letter" newsletter, said many developers, especially in mature markets, are already generating 20% to 30% of their revenue from upgrade sales.

He predicts a shift in emphasis during the next few years from new product rollouts to upgrade strategies, as users who are moving to more powerful platforms demand souped-up versions of their favorite applications.

Recognizing that a good chunk of future revenue will come from upgrades, software reseller Corporate Software, Inc. not only tailors services to a user's needs but also claims it has been after key developers for about a year to come up with a standard upgrade policy.

Paul Grayson, president of Micrografx, Inc., said that vendors had better get their houses in order. "If customers think you are making money off the upgrade, it makes them mad. They feel like they already paid you once."

Micrografx once offered a $149 upgrade to Draw Plus, which retailed at $395, but was forced by customer complaints to drop the price to $99. These days, Micrografx offers its buyers six months' free protection and after that, charges $49 for minor upgrades, $99 for major ones.

The happiest users tend to be those on networks, particularly those using diskless workstations. These users say upgrades are a snap, typically taking a couple of hours.

Swiss Bank can upgrade overnight on its network of diskless workstations. It's a different story for its stand-alone workstations. "I don't have the manpower to keep 400 workstations at the same [application] level," Adinolfi said.

However, not even the "LAN-locked" are safe, Illari warned. He estimated that he handles about 300 networkwide upgrades per year, adding that his group spends at least one-quarter of its time dealing with upgrades. So much so that Illari not only has a separate local-area network dedicated to testing new releases, but his group has also developed an automated system to deal with network system software upgrades.

Another critical issue revolves around upgrade compatibility with other desktop applications. Each upgrade must be checked against each piece of system software. It is time-consuming, and inconsistencies are inevitable.

Microsoft Corp.'s Windows 3.0 may be the key here, said users, who are hoping that if enough developers write to specific Windows application programming interfaces, then upgrade compatibility issues will diminish.

Developers can also kill the customer with kindness. Blumenstein, who is also a corporate consultant, said he is on Wordperfect Corp.'s automatic update list. He now has more than 100 Wordperfect Version 5.1 disks, along with three sacks full of upgrade and update disks from the service-oriented developer.

"Wordperfect's approach is that they will go out of their way to fix [problems] and make everything as perfect as possible. It's a great ethic, but there is a thin line between reality and madness," an exasperated Blumenstein said.

To release or not to release?

Here is one example of upgrade policies. The installed base of Lotus Development Corp.'s 1-2-3 spreadsheet for DOS is made up of seven different versions. Lotus offers another five versions spanning as many platforms and is working on a sixth version — this one for Windows 3.0.

1-2-3 Release 3.0 — Shipped June 20, 1989

- Retail price: $595 for Standard Edition, $685 for Server Edition and $395 for Node Edition.
- Release 3.0 of 1-2-3 is priced at $495 through 1989.
- Registered buyers of Release 2.01 from Sept. 6, 1988, until 30 days after Release 2.2 shipped may upgrade free to Releases 3.0 or 2.2.
- Other users could upgrade for $150.

1-2-3 Release 2.2 — Shipped July 27, 1989

- Retail price: $495 for Standard Edition, $595 for Server Edition and $295 for Node Edition.
- Registered buyers of Release 2.01 between Sept. 6, 1988, and Aug. 31, 1989, could upgrade free to Releases 2.2. or 3.0 until Dec. 31, 1989.
- Other users pay $150 to move to Release 2.2.

1-2-3/G — Shipped March 26, 1990

- Retail price: $695
- 1-2-3 Release 2.2 users can upgrade to G for a special price of $75 from Lotus.
- Master Agreement customers with proof of purchase may upgrade for $75 through participating Lotus resellers.
- All other 1-2-3 users can upgrade to G for $150.

123 Release *.*

1-2-3 Release 3.1 — Shipped Sept. 10, 1990

- Retail price: $595 for Standard Edition, $795 for Server Edition and $495 for Node Edition.
- Users who buy or have bought Release 3.0 on or after May 7, 1990, are entitled to a free upgrade to Release 3.1 through Dec. 31, 1990. Free network upgrades can be redeemed through March 31, 1991.
- Customers who bought Release 3.0 before May 7, 1990, can upgrade to Release 3.1 for $35.
- 1-2-3 Release 2.2 users can upgrade for a suggested retail price of $75 through Dec. 31.
- Users of 1-2-3 Releases 1, 1A, 2 and 2.01 may upgrade to Release 3.1 for a suggested retail price of $150.

PATRICIA KEEFE

Numbers hold true

Besieged by what its members saw as a wave of often unnecessary software upgrades, Microcomputer Managers Association, Inc. (MMA) issued a white paper three years ago that took a hard look at upgrade costs, among other issues.

The report went on to outline the time and steps required to upgrade 100 copies of a typical package. What follows is a condensed version:

- Purchase a single copy of the new version or obtain an evaluation copy (1-2 weeks).
- Test for bugs, functionality, hardware, software and file compatibility (4-8 weeks).
- Get management approval to purchase package (4-8 weeks).
- Collect systems disks from users (4-10 weeks) and order upgrades (2 weeks).
- Develop training courses (2-5 weeks).
- Begin installing upgrades. A total of 300 man-hours is required, assuming four people work full-time for nine working days.

If all goes well, the process takes an estimated 17 to 32 weeks and close to 450 man-hours to complete. Users must further add labor costs to the out-of-pocket cost of the upgrade.

Interviews with MMA members who developed the 1987 report said these numbers hold true today.

PATRICIA KEEFE

Intel to raise the curtain on fast parallel supercomputer

BY J. A. SAVAGE
CW STAFF

BEAVERTON, Ore. — Intel Scientific Computers will unveil a parallel supercomputer tomorrow that may be the fastest machine available, according to developers and analysts.

The computer will have more than 500 Intel I860 reduced instruction set computing processors in a hypercube architecture and will run at a theoretical 20G floating-point operations per second (FLOPS), according to Jeff Canin, an independent consultant in San Francisco. Intel's earlier machines were capable of a theoretical peak of 7.6G FLOPS with 128 processors. The older machines were also rated at 4,224 million instructions per second (MIPS). No MIPS rating was available for the new computer.

"No applications will be able to harness all that power, but they are constructing the computer," Canin said.

The difficulty with harnessing the potential power is that at this point, nearly all applications for parallel computers must be custom-made to break up a problem so that a part of it runs on each of the processors. Efforts to write such code are being undertaken at Intel as well as in academic settings.

The computer will be owned by a consortium of academic, private and government users and will reside at the California Institute of Technology in Pasadena, Calif., analysts said.

Intel has said it is working on technology to allow speeds of one trillion FLOPS. It is growing out of the $27 million Touchstone project, which derives approximately one-third of its funding from the Defense Advanced Research Projects Agency and the remainder from Intel, according to Benjamin Peek, associate director at the Oregon Advanced Computing Institute.

Buyers may stem laptop flood

User concerns over service and support may stymie smaller vendors

BY MICHAEL FITZGERALD
CW STAFF

LAS VEGAS — Laptop computer vendors lining up to place their Intel Corp. 80386SX chips on the table may find corporate buyers unwilling to gamble with anyone other than well-heeled suppliers able to bankroll national support and service.

"Comdex is going to be swamped with notebooks from people you've never heard of before," said Robert Charlton, an industry analyst at Dataquest, Inc., a San Jose, Calif.-based market research firm.

However, while introductions of speedier, lighter portables may generate the most excitement at Comdex/Fall '90, managers responsible for putting the machines out in the field said they need more than the latest technology.

Support is the key issue for New York Life Insurance Co., which has more than 10,000 agents in the field, including more than 4,000 who use NEC Technologies, Inc. Prospeed 386SX portables.

"When I'm dealing with 10,000 agents across the country in places like Ulysses, Kan., I need a company behind me that I know can deliver quality service," said Richard Nelson, vice president at New York Life Insurance Co.'s Agency Systems Group. "If they can keep it working in Ulysses, then they can make it work anywhere, and if they can't, then we have problems."

Bruce Erickson, marketing and administrative systems manager at Gerber Products Co., said, "We want [vendors] with some proven experience before we'd really think about them."

Gerber plans to oufit its 530-strong sales force with notebook computers and either a Grid Systems Corp. Gridpad or a Norand Corp. handheld terminal in 1991.

"We're looking for a nationwide support contract — because this is a national thing — and company stability, as well as the durability of the machine," Erickson said, adding that the company was leaning toward Compaq Computer Corp.'s LTE.

Those concerns could mean problems for no-name and new-name vendors such as Sanyo Business Systems Corp. or Nippon Steel's Librex Computer Systems, which have not established distribution channels or support organizations. Sanyo and Librex are just two of the vendors scrambling to enter the sizzling notebook market, which is expected to grow at 30% for at least the next three years, said Tim Bajarin, executive vice president at Creative Strategies Research International, Inc.

Breaking tradition

Gilbert Hoxie, who runs a portable computing consulting firm in Los Angeles, says that individuals have traditionally been the buyers of cutting-edge portables. He said he thinks the 386SX chip will change this.

Low-ball pricing may not be much of a factor for corporate users, despite the vast difference between the $6,499 Compaq LTE 386S/20 and the $2,699 machines distributed by Austin Computer Systems, Inc., in Austin, Texas, and Northgate Systems, Inc. in Eden Prairie, Minn. Dan Ness Jr., a personal computer analyst at Computer Intelligence in La Jolla, Calif., said he expects the market to split, with corporations buying from name vendors and individuals purchasing from smaller, less established vendors.

Not all corporate users are wedded to a well-known name. Caisse Nationale de Credit Agricole's U.S. operations, for instance, currently keep libraries of Compaq portables in their Chicago headquarters and New York, San Francisco and Los Angeles offices. However, the company is both interested in the new SX machines and open to new vendors, said Arthur Claudio, first vice president and head of U.S. data processing.

"If something came out that was better [than Compaq], we'd go with that," Claudio said. His only concerns center on any new vendor being able to also maintain the Compaq machines.

Having a relatively well-known name could help companies such as AST Research, Inc. and Texas Instruments, Inc. overcome a lack of presence in the market.

"We pretty much will stick with the laptops from Compaq and AST, if AST meets the requirements," said Enrique Crespo Jr., corporate manager of user computing services at The Torrington Co., a $2 billion division of Ingersoll-Rand.

Lighten up

Notebook and laptop PC sales are projected to have strong growth in the U.S. during the next three years

1990*	Percent of market	Total unit sales
Notebook	15%	398,000
Laptop/ luggable	75%	1,700,000
Luggable	10%	197,000

1993*	Percent of market	Total unit sales
Notebook	43%	2,000,000
Laptop	55%	2,500,000
Luggable	2%	97,000

*Projected

Source: Workgroup Technologies, Inc.
CW Chart: Paul Mock

Pick your portable

The following is a partial list of Intel 80386SX-based notebook computers that were announced last week or will be announced today:

- Toshiba American Information Systems, Inc. released on Wednesday the T2000SX, a 6.9-pound, 16-MHz computer with IBM Video Graphics Array (VGA) display, a 20M- or 40M-byte hard drive and a 2,400 bit/sec. internal modem. It also uses a new nickel hydride battery technology. The T2000SX will retail for either $4,999 or $5,499.
- AST Research, Inc. will announce the Premium Exec today, a 6½-pound, 20-MHz notebook with VGA display and a 20M- or 40M-byte hard drive. Prices will be $2,995 or $3,395.
- Nippon Steel subsidiary Librex Computer Systems, Inc. will unveil a 6.6-pound, 20-MHz box with VGA display and a 20M- or 40M-byte hard drive. Pricing will start at $4,100.
- Boulder, Colo.-based start-up Astarte Computer Systems, Inc. will offer Quest, a 6.6-pound, 16-MHz machine with VGA display, a 20M-byte hard drive and a 2,400 bit/sec. internal modem with an integrated phone for voice communication. The keyboard will feature a "keymouse," a key that operates as a pointing device. Retail price will be $3,950.
- Keytronic Corp., a 20-year-old Spokane, Wash.-based company known mostly for keyboards, will introduce a 6.6-pound, 16-MHz box with VGA display, 2,400 bit/sec. modem, an internal facsimile modem and the option to use lithium or alkaline batteries. It will be available only to OEMs.

Noticeably absent from the ranks will be NEC Technologies, Inc. and Zenith Data Systems, both of which are reputed to be waiting to release an SX notebook.

Sparc-based laptop aired

BY MAURA J. HARRINGTON
CW STAFF

With much of the DOS-based laptop market dominated by a handful of computer vendors, it is difficult to introduce a truly competitive laptop computer as a start-up company.

Nevertheless, San Diego-based Research, Development & Innovations, Inc. and Trigem Corp., a subsidiary of Seoul, Korea-based Trigem Computer, Inc., introduced Britelite, their first reduced instruction set computing (RISC)-based laptop computer, last week.

Britelite is an 8½-pound battery-operated computer running Sun Microsystems, Inc.'s Unix operating system Version 4.1. However, the RISC-based machine, based on Scalable Processor Architecture, also has the capability of emulating complex instruction set computing processors.

This will enable it to run applications for MS-DOS and Apple Computer, Inc.'s Macintosh, according to a spokesman at Trigem.

"Although the machine does not run as fast when it is in emulation mode, it is a very powerful machine and has the capability to run the three most popular operating systems," said Young Kimm, chairman at Trigem.

Steve Ferguson, manager of systems development support in the exploration department at Amoco Corp. in Houston, cited a potential market barrier for a Unix-based laptop: "I know of very few technical people that I would expect to carry around a Unix workstation. Most of what we need for portable computing can be done on the DOS-based machine."

The laptop will be priced from $8,000 to $12,000 when it becomes available in volume in the first quarter of 1991.

Plastic-cable vendors tout lowered installation costs

BY JOANIE M. WEXLER
CW STAFF

Citing the potential for 50% savings on cabling costs with their plastic optical-fiber products, Codenoll Technology Corp. and the Packard Electric Division of General Motors Corp. said they will roll out a complete line of products at this week's Comdex show in Las Vegas that will allow Ethernets to communicate over the virgin medium.

The companies demonstrated the technology in September at Networld '90 but had not announced product availability or pricing.

The potential price savings come mainly in labor costs for installing the plastic fiber, which is more flexible than glass fiber and easier to connect than glass or copper, Codenoll marketing executive Brian Ramsey said.

"Plastic fiber can be installed in about a minute by a novice and in under 30 seconds by a technician," he said.

"If the company can demonstrate that this technology really is cheaper than unshielded twisted-pair, it is certainly something Ethernet users should look at for adding on Ethernet segments," said Michael Howard, president of Infonetics Research Institute, Inc., a market research and consulting firm in San Jose, Calif.

The initial products will be available during the first quarter of 1991 and will support distances of 50 meters between stations, in contrast with the 100 meters specified by the 10Base-T standard for running 10M bit/sec. Ethernets over unshielded twisted-pair.

Codenoll said, however, that the companies plan to extend the distance to 100 meters during the next few months.

Aimed directly at the work group local-area network market rather than at backbone applications, the product suite includes a $495 POF Multistar Concentrator Module. The module contains ports for Ethernet segments running over thin or thick coaxial, unshielded twisted-pair and glass- or plastic-fiber network segments.

The mix-and-match nature of the concentrator allows users to position new network segments for Fiber Distributed Data Interface LAN speeds of 100M bit/sec., which will be required for the to-the-desktop multimedia applications that are on the horizon, according to Ramsey.

The product suite also includes network adapters for personal computers based on Industry Standard Architecture ($495), IBM's Micro Channel Architecture ($795) and Extended Industry Standard Architecture ($1,295).

Multimedia age not due 'til '95

BY MAURA J. HARRINGTON
CW STAFF

LAS VEGAS — While multimedia is expected to be a hot topic of conversation at this week's Comdex/Fall '90 show, information systems managers do not have to worry about having to spend a lot of money on the technology just yet.

Intel Corp. turned up the heat in the multimedia development market last week with the announcement of its I750 Video Processor family. This second-generation product is one of few "true multimedia" chip sets, incorporating multiple digital video components such as text, graphics, video stills and motion video capabilities into just two chips, according to Intel.

IBM announced a product last week that it said will allow users on systems as small as 640K-byte Intel 8088-based machines to play back audio and video without additional hardware. Storyboard Live is a multimedia software package said to provide entry-level DOS users with animation, motion video, sound and enhanced on-screen presentation capabilities. The package is expected to be available Nov. 30 and costs $120.

However, analysts agreed that it will be at least 1995 before any true multimedia machine is available in volume, complete with applications that address the needs of business managers in corporate America. Such applications include full-motion video training applications with sound, motion video teleconferencing applications and videoconferencing programs that allow users to send voice electronic mail with a video or picture of themselves simultaneously in one application.

"IS managers are still wrestling with imaging, and they have to do that before they even begin to wrestle with multimedia," said Thornton May, director of imaging research at Nolan, Norton & Co., a market research firm based in Lexington, Mass. May added that IS managers in particular have too much on their minds this year to think about the latest and greatest technology that is almost here.

May added that multimedia is still rather ambiguous in terms of products and applications. "So far, multimedia is a creative and expensive thought that is difficult to turn to a product during an economic downturn," he said.

Despite the financially hard times that IS managers and many vendors have been faced with of late, many companies specializing in multimedia technology — particularly semiconductor companies — have introduced digital multimedia chip sets or portions of digital multimedia chip sets.

Unlike many other multimedia chips, the chip set that was introduced last week by Intel incorporates compression/decompression technology onto the chip, which analyst Jay Bretzman at International Data Corp., a market research firm based in Framingham, Mass., said is an important component of multimedia.

> "IS MANAGERS are still wrestling with imaging."
>
> THORNTON MAY
> NOLAN, NORTON & CO.

Other companies that have introduced multimedia chip sets or portions thereof include AT&T's Microelectronics Division and San Jose, Calif.-based Chips and Technologies, Inc.

There are several companies already incorporating these chips and other similar chips into personal computer-size boards or directly into their products.

For example, Avtex Research Corp., a multimedia software firm based in Campbell, Calif., is working with Intel "on several multimedia applications, including a video electronic mail package, which would allow a user to compile all sorts of reports from servers on a local-area network, including voice, video, images, graphics and text," said Avtex President Mark Bunzel.

Picturetel Corp., based in Peabody, Mass., announced an agreement with Intel to make its visual telecommunications boards compatible with Intel's third generation of Video Processor products, due out in 1993.

"We are designing a board that will allow a PC user to convert his or her PC into a videoconferencing station," said Robert Mitro, Picturetel's vice president of sales and marketing.

Microsoft, Tandy pitch multimedia standard

BY PATRICIA KEEFE
CW STAFF

Microsoft Corp. and Tandy Corp. will team up on Nov. 26 — along with IBM, Zenith Data Systems and Fujitsu Ltd. — to unwrap "an affordable, deliverable, multimedia computing platform with strong manufacturer and developer support." The target delivery date is 1991.

Microsoft said it intends to pitch the Windows/M blueprint — consisting of mostly existing standard hardware, systems software, development tools and "definitive titles" — as a standard on which developers can build interactive, mostly event-driven, multimedia applications.

Hardware manufacturers are expected to announce that they will adopt Windows/M and discuss plans for mostly Intel Corp. 80386SX-based multimedia machines, said Tim Bajarin, an analyst at Creative Strategies Research International, Inc. Tandy is expected to upgrade its Model 2500XL, Fujitsu announced a machine, and IBM will reportedly discuss a new version of the Personal System/2 Model 60.

Users will be able to upgrade to a multimedia system by spending $600 to $1,000 on a compact disc/read-only memory (CD-ROM) and an audio card.

Microsoft's systems software will support audio, enhanced image manipulation and animation, as well as a control device for such external sources as videodiscs and videocassette recorders, a recent issue of the "Information and Data Base Publishing (IDP) Report" said.

Windows/M consists of various drivers, hooks to a CD-ROM and extensions based on technology from Macromind, Inc. Users will be able to play animation, text, graphics and audio sequences under Windows, calling up sound and image from CD-ROM drives.

The Tandy/Microsoft announcement precedes by a day the Microsoft Multimedia Developer Conference slated for Nov. 27 and 28. Attendees there will receive Windows 3.0's software development kit and a prerelease version of the Windows/M multimedia development kit.

"After attending this conference, [developers] will be equipped with all . . . [they] will need to begin immediate development," hinted Rob Glaser, general manager of Microsoft's Multimedia Systems Group, in a letter to attendees.

Tandy is key — both as a manufacturer and a distributor — to Microsoft's drive to position Windows-based multimedia in the home, school and business markets, Glaser said last week.

According to the "IDP Report," Tandy's multimedia computer is said to include a built-in CD-ROM drive, an Intel 80286 or 80386 chip, at least 2M bytes of random-access memory, a 30M-byte hard drive, an IBM Video Graphics Array monitor, audio capabilities and various I/O devices, including controllers and joysticks.

Tandy has been demonstrating the unit, several sources said. But Ed Juge, director of market planning at Radio Shack, said that if Tandy had a multimedia box, it would be shipping one.

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Systempro-compatible bows

BY RICHARD PASTORE
CW STAFF

IRVINE, Calif. — Advanced Logic Research, Inc. (ALR) gave an ego boost to Compaq Computer Corp. and a price break to users last week when it announced a "Systempro-compatible" dual-processor machine called the Powerpro. The Powerpro reportedly runs some of the same software adapted for the multiprocessor Systempro at 30% lower cost.

"The Systempro has been on the market for about a year, and nobody really has challenged it," said ALR Vice President of Marketing Dave Kirkey.

ALR's marketing tack bestows the aura of an industry standard for multiprocessor technology on the Systempro and its software, observers said. Even Compaq seems happy about it. "If someone wants to develop products that utilize our software, that's fine with us," said Compaq product marketing manager Lorie Strong.

ALR described the Powerpro as a server for users who want to start out on a budget and buy off-the-shelf software. ALR's previous multiprocessor offering, the Multiaccess 3000, uses a proprietary Unix version.

The Powerpro's pricing may not have much impact on the buying public, however. Users and analysts said price is not a key consideration when buying high-end servers for critical applications. They rate vendor reliability and functionality higher.

The Powerpro features one or two 33-MHz Intel Corp. I486 processors that process 14.7 to 40 million instructions per second. Unlike the Systempro, the Powerpro supports small computer systems interface disk drives.

The system will be demonstrated at Comdex/Fall '90 in Las Vegas and is slated to ship in the first quarter of 1991.

Face-off

Advanced Logic Research's Powerpro takes on Compaq's Systempro with claims of greater storage options and lower prices

	Bus	Hard disks	Graphics	Price
ALR Powerpro 486/33	EISA	ESDI SCSI 150M byte 330M byte 650M byte 1.2G byte	Super VGA (optional)	**Single processor:** $12,495 to $19,995 **Dual processor:** $17,595 to $24,595
Compaq Systempro 486/33	EISA	IDA 240M byte 420M byte 840M byte	VGA (standard)	**Single processor:** $20,999 to $29,999 **Dual processor:** $27,998 to $36,998

Source: Advanced Logic Research, Inc. and Compaq Computer, Corp.

TRENDS

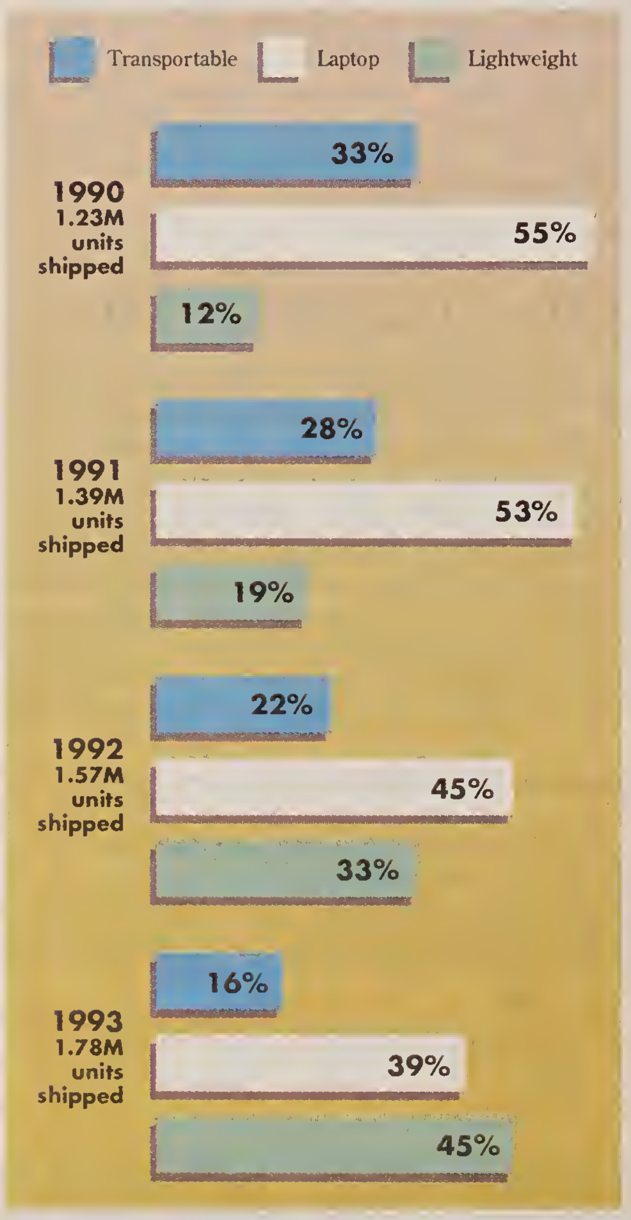
PORTABLE COMPUTERS

The miniaturization of portable computers is ongoing. Users have never lacked choices, but there has always been a trade off between size and functionality. Three segments struggle for user preference, with the lightest machine making the most headway.

Portraits of three portables

(Percent of total U.S. unit shipments)*

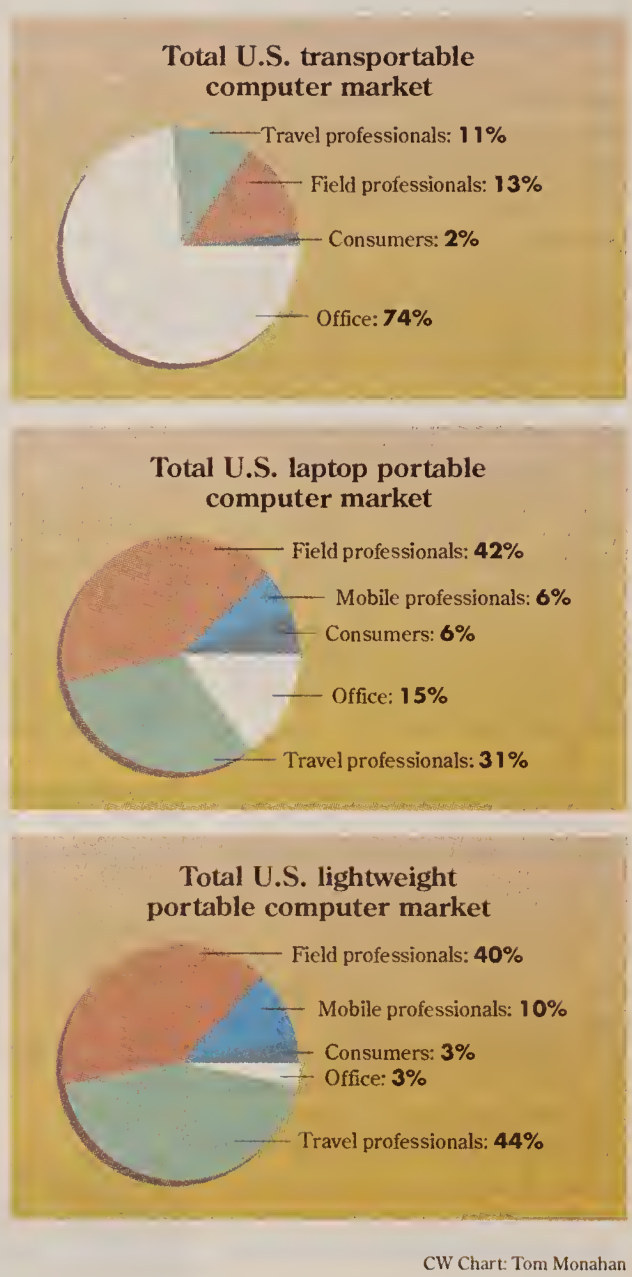
Overall, smaller machines with longer lasting batteries will abound starting in 1992. Laptops in the middle will parry both low end transportables and light weights for market share



Projected 1993 use

(Percent of units shipped)

By 1993, each segment will have found a niche. In terms of units shipped, transportables will find themselves in the office, laptops in the field, and lightweights will be traveling first class



*Projected

Source: Market Intelligence Research Corp., Mountain View, Calif.

CW Chart: Tom Monahan

NEXT WEEK

Longer hours. More responsibility. Demanding users. For many, life in information systems, which is never easy, is getting tougher. How do you handle the extra pressures of the '90s and keep smiling? In Depth talks to IS veterans like **James C. Miller** of James River Corp. for their tips on how to reduce stress in their professional lives.

Manuello Paganelli

Unrealistic expectations can thwart efforts to improve productivity through investment in information systems. Such expensive disappointments can be avoided. Sometimes all it takes is more careful diagnosis of process problems. Take a look at Executive Report to find out more about what works, what doesn't and why.

INSIDE LINES

U.S. Sen. Ed Zschau (R-Silicon Valley)?

With Sen. Pete Wilson (R-Calif.) winning the election as governor and Sen. Alan Cranston (D-Calif.) not running for reelection in 1992, California politics is even more interesting than usual for the computer industry. Wilson will appoint a Republican to fill his Senate seat, and one of the leading prospects is Ed Zschau, the computer industry's favorite Republican (who lost to Cranston in 1986). Whoever is appointed will have to run for election in 1992. Possible Democratic candidates for either 1992 Senate race include Rep. Robert Matsui — the computer industry's favorite Democrat — as well as Dianne Feinstein, Jerry Brown and Rep. Mel Levine.

The dwarf and the sumo

Look for Poqet Computer to offer a notebook-size machine with a full-featured keyboard for the U.S. market starting in April 1991. A source close to Poqet said April is the target date for releasing something very similar to the 2.2-pound, 8.½- by 11-in. form-factor computer that Poqet's sugar daddy, Fujitsu International, announced in Japan last month (a machine designed and licensed by Poqet). A Fujitsu exec, meanwhile, hinted that the company was readying a U.S. version of the machine and that April wouldn't be an unreasonable date to see it here.

Really bad reviews

Stupid Mac Tricks by Bob Levitus, a book and disk compendium of 14 inane Apple Macintosh programs, which is now making its way into bookstores, has some security experts fuming. Among the programs is one that causes any application on screen to start to disintegrate as if hit by a computer virus. The idea is that you're supposed to install this on an unsuspecting colleague's Mac and sit back while he or she has a heart attack (simulated, we hope). "As a practical joke, this is not too funny," said noted security expert Harold Highland.

IS will have its day

Merrill Lynch's massive reorganization into six divisions a few weeks ago has had no effect on the company's corporate information systems group so far. "But that doesn't mean it won't," a spokeswoman said. "We just haven't done that group yet." DuWayne Peterson, the generally outspoken Merrill IS chief, declined comment.

Multiuse for PS/1?

Could the Personal System/1 live a double life as a multimedia machine? Mark Bunzel, a consultant at Avtex Research, thinks so. He points out that the PS/1 comes with a high-quality video display and adds that buried in the announcement was a promise to provide a sound board. IBM is expected to detail plans for a sound board in a few weeks at the same announcement where Microsoft will try to convince the public that you can too run multimedia on as low as a 10 MHz, Intel 80286-based machine.

Memphis Law

What do Elvis Presley's doctor, the *Exxon Valdez,* film director John Landis and the Nashville Electric Service outsourcing proposal have in common? The same defense lawyer. Last week, the Nashville Electric board voted to retain high-profile defense attorney James Neale for its defense against the recent suit filed by Nashville Electric employees seeking to prevent outsourcing IS to a Memphis services firm. Nashville native Neale, who was involved in the above cases, is probably not available, however, as he remains active in Exxon's defense in the ongoing *Valdez* litigation.

Steamed by Microsoft Office, Lotus is in a lather, says Bill Bluestein at Forrester Research. He points out that Microsoft has the monopoly on the operating environment (Windows), and for $900, is bundling four related applications into the same box. Lotus reportedly is looking into coming out with a similar pack, including G and Freelance, for OS/2. Bill "Mr. Windows" Gates must be shaking in his boots. If you can think of better things to do with OS/2, call News Editor Pete Bartolik at 800-343-6474, zip us a fax to 508-875-8931 or message COMPUTERWORLD *on MCI Mail.*

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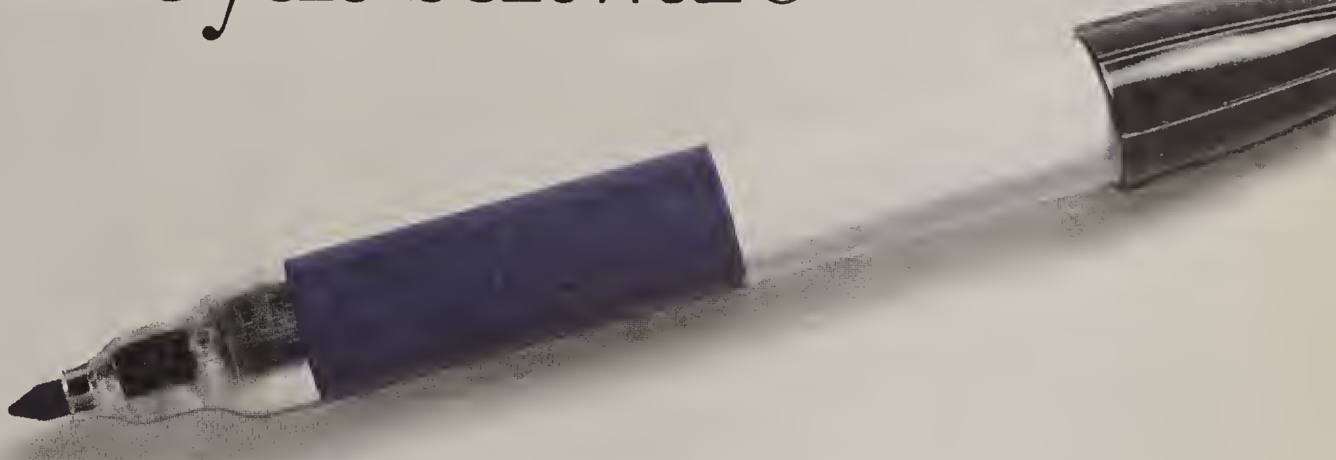

If you're shopping around for a better way to shrink your applications backlog, make sure the latest release of IBM's Cross System Product application generator is on your software tools list.

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